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Set     Items   Postings   Description
S1       3922      64908   S INTERSPIN? OR INTERVERTEB?
S2       4340      53937   S INTERVERTEBRA? OR INTERDISC? OR INTERDISK? OR INTERSPINE? OR
INTERSPINOUS?
S3    1654530   19808211   S SPINE? OR VERTEBRA? OR SPINAL OR SPINOUS? OR DISK? OR DISC?
OR SPIN?()APOPHY? OR LUMBAR?(2N)(SACRUM? OR SACRAL?)
S4       72385     567612   S OSTE? OR OSSO? OR OSTO? OR OSSE? OR ENDOSTE? OR PERIOSTE?
S5      134542    1690756   S BONE? ? OR ORTHOPED? OR ORTHOPAED? OR OSSEOUS? OR SKELET?
S6      541934    5636703   S IMPLANT? OR PROSTHE? OR SHIM???? OR ENDOPROSTHE? OR INSERT? ?
OR SPACER? OR EMPLANT? OR INFIX? OR REPLACEMENT? OR OSTEOSYNTHE?
S7      853148   11310985   S BLOCK? ? OR SPACER? OR WEDGE? OR SHIM? OR BUSHING? OR DONUT?
OR TORUS? OR GROMMET? OR DOUGHNUT?
S8      478246    2279850   S SQUARE? OR RECTANG? OR QUADRILAT?
S9      116476    1082700   S S1:S5(7N)S6:S8
S10      50744     642154   S RESILIENT? OR PLIANT? OR RUBBER? OR ELASTOMER? OR
COMPRESS?BL? OR FLEXIB? OR FLEX????
S11      19086     173967   S ELASTIC? OR DUCTIL? OR TRACTIL? OR SPRINGY OR SPRINGI? OR
SPONGIFORM? OR LATEX?
S12      12577     103884   S (SHOCK? OR VIBRAT? OR ENERGY? OR BLOW? OR FORCE? OR OSCILLAT?
OR IMPACT? OR MOTION? OR MOVEMENT?)(2N)(STOP? OR ARREST? OR SQUELCH? OR DAMPEN? OR ABSORB?
OR INHIBIT? OR MINIM? OR ISOLAT? OR DAMPER? OR ATTENUAT?)
S13     109564    2541831   S INTERMEDIAT? OR SANDWICH? OR INTERSPER? OR BETWEEN? OR
INTERSPAC? OR INTERSPAT? OR INTERVEN? OR INTERSTIT?
S14      56483     489262   S INTER OR BETWIXT? OR INTERADJACENT? OR INTERJACEN? OR
CENTRAL?
S15       7542      66255   S INTERLEAV? OR INTERLAMINA? OR INTERSHUFFL? OR INTERSPERS?
S16      55089    1512658   S PLATE? OR PANEL? OR FLAT()PIECE? OR BRACKET? OR PLANK? OR
PANE? ? OR BASEPLATE?
S17       1707      24306   S METALPLATE? OR METALSHEET? OR METAL?()SHEET? OR BACKPLATE? OR
FACEPLATE?
S18       5548      46340   S (THREAD? OR HELIC? OR HELIX? OR COIL? OR
SPIRAL?)(2N)(CONNECT?R? OR ROD OR RODS OR POLE? OR SLEEV? OR SHEATH? OR SHAFT? OR NAIL? OR
TACK? ? OR ANCHOR? OR RETAINER? OR PEG OR PEGS OR STAKE?)
S19      44844     986902   S SCREW? OR BRAD? ? OR RIVET? OR PIN OR PINS OR CONNECT?R? OR
FIXAT?R?
S20     115035   11586710   S TWO OR TWIN OR DOUBLE OR PAIR OR TWOFOLD OR TWOSOME OR DUAL?
OR 2 OR 2ND OR SECOND?
S21      57408     678382   S (OPPOSING OR OPPOSITE)()SIDE? ? OR TWOPIECE? OR TANDEM? OR
SIAMES? OR DUPLE? OR DUO OR COUPLE?
S22      89807    3019330   S MATE? OR MATCH? OR MALE?(3N)FEMALE? OR MORTIS?(3N)TENON? OR
DOVETAIL? OR DOVE()TAIL?
S23      20022     172804   S FORMFIT? OR INTERLOCK? OR COMPLEMENTARY? OR FORM()(FIT OR
FITTED OR FITTING OR FITS) OR CONCAV?(3N)CONVEX?
S24      31173     253635   S MESH? OR INTERMESH? OR INTERLINK? OR INTERCONNECT? OR
INTER()(LOCK? OR SECT? OR LINK? OR JOIN? OR FIT OR FITS OR FITTED OR FITTING?) OR
INTERFIT?
S25       1205       4341   S (FIT OR FITTED OR FITTING OR FITS)()TOGETHER OR SYNCHROMESH?
OR ENMESH?
S26      72101    1840286   S HOLE? OR THROUGHHOLE? OR THRUHOLE? OR PERFORAT? OR CHANNEL?
OR TUNNEL? OR PASSAGE?
S27      31311      49239   S IC=(G06F? OR A61B? OR C07D? OR B01J? OR A61F? OR A61M?)
S28      31311     617875   S S9 AND S27
S29     116476    1699314   S S28 OR S9
S30        984     183496   S S29 AND (S10:S15)(7N)S6:S8 AND S6:S8(7N)S13:S15(7N)S16:S17
AND S18:S19(7N)S26 AND S26(7N)S6:S8
S31        277     116818   S S30 AND S27
S32        954     240116   S S30 AND S20:S25(7N)(S16:S17 OR S18:S19)
S33         38      37231   S S32 AND S20:S21(7N)S17:S18 AND S22:S25(7N)S18:S19
S34        303     150307   S S31 OR S33
S35        268     118644   S S34 AND AY=1970:2004
S36        268      70028   IDPAT (sorted in duplicate/non-duplicate order)
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S37 267 69917 IDPAT (primary/non-duplicate records only)

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[File 348] **EUROPEAN PATENTS** 1978-2007/ 200726
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**File 348: For important information about IPCR/8 and forthcoming changes to the IC= index, see HELP NEWSIPCR.*

[File 349] **PCT FULLTEXT** 1979-2007/UB=20070628UT=20070621
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39/5/253 (Item 253 from file: 349) **Links**
PCT FULLTEXT

00292099
ANTERIOR INTERBODY FUSION DEVICE
DISPOSITIF ANTERIEUR D'ARTHRODESE DU RACHIS CERVICAL

Patent Applicant/Patent Assignee:

- **DANEK MEDICAL INC;**
  ; ;

= US 5397364

	Country	Number	Kind	Date
Patent	WO	9510248	A1	19950420
Application	WO	94US11003		19940930
Priorities	US	93134049		19931012

Designated States: (All protection types applied unless otherwise stated - for applications 2004+)

Main International Patent Classes (Version 7):

IPC	Level
A61F-002/44	Main
A61F-05:04	

Publication Language: English
Filing Language:
Fulltext word count: 8401

English Abstract:

An interbody fusion device (20) includes a pair of lateral **spacers** (21) and a pair of **central spacers** (22, 23), each sized for percutaneous introduction through a disc resection portal in the **disc** annulus. Each of the lateral **spacers** (21) includes opposing side faces (33) defining a **channel** (34) therein, while each of the **central spacers** (22, 23) includes arms (47, 57) at their opposite ends configured to be received within a **channel** (34) of a corresponding lateral **spacer** (21). The arms and **channels** are interlocking to prevent separation of the components once assembled within the intradiscal space. The assembly of the **central** and lateral **spacers** defines a cavity (25) therebetween for insertion of **bone** graft material. The **central** and lateral **spacers** are configured so that the **bone** graft cavity is oriented over the weakest, but most vascular and biologically active, **bone** of the **vertebral** body, while the lateral **spacers** are situated adjacent the **disc** annulus and over the strongest vertebral bone.

French Abstract:

US005397364A

United States Patent [19]

Kozak et al.

[11] Patent Number: 5,397,364

[45] Date of Patent: Mar. 14, 1995

[54] ANTERIOR INTERBODY FUSION DEVICE

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[73] Assignee: Danek Medical, Inc., Memphis, Tenn.

[21] Appl. No.: 134,049

[22] Filed: Oct. 12, 1993

[51] Int. Cl.[6] A61F 2/44

[52] U.S. Cl. 623/17; 606/61

[58] Field of Search 623/17, 11, 16

[56] References Cited

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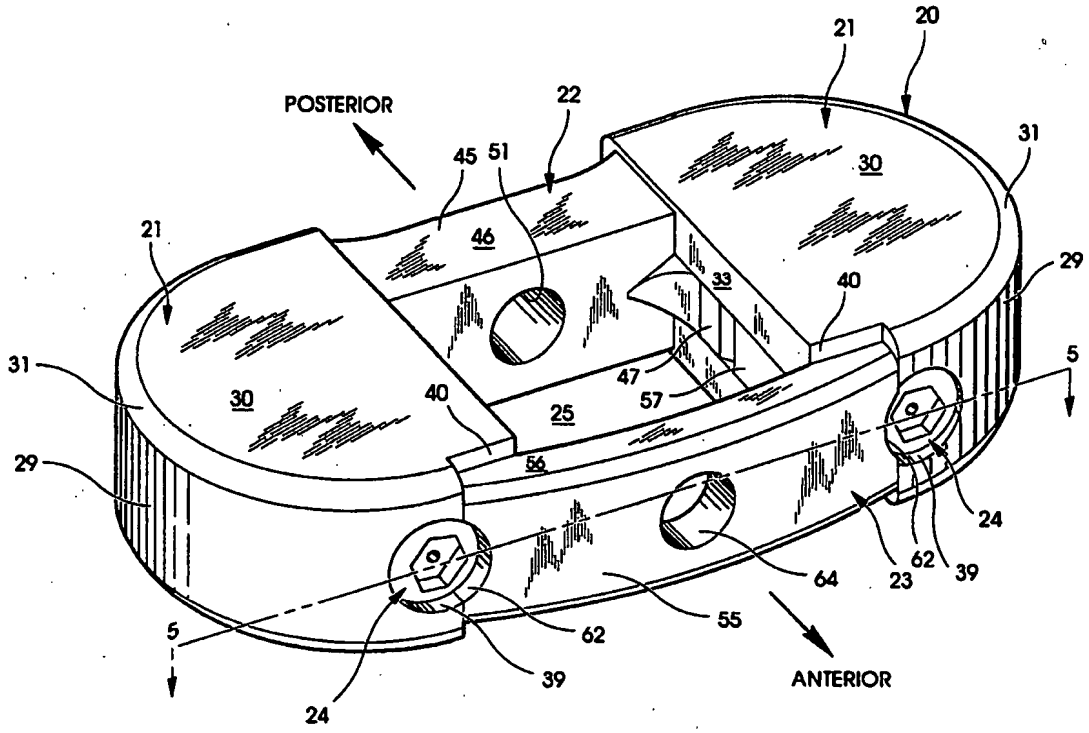
Primary Examiner—David Isabella
Attorney, Agent, or Firm—Woodard, Emhardt, Naughton, Moriarty & McNett

[57] ABSTRACT

An interbody fusion device includes a pair of lateral spacers and a pair of central spacers, each sized for percutaneous introduction through a disc resection portal in the disc annulus. Each of the lateral spacers includes opposing side faces defining a channel therein, while each of the central spacers includes arms at their opposite ends configured to be received within a channel of a corresponding lateral spacer. The arms and channels are interlocking to prevent separation of the components once assembled within the intradiscal space. The assembly of the central and lateral spacers defines a cavity therebetween for insertion of bone graft material. The central and lateral spacers are configured so that the bone graft cavity is oriented over the weakest, but most vascular and biologically active, bone of the vertebral body, while the lateral spacers are situated adjacent the disc annulus and over the strongest vertebral bone.

18 Claims, 9 Drawing Sheets



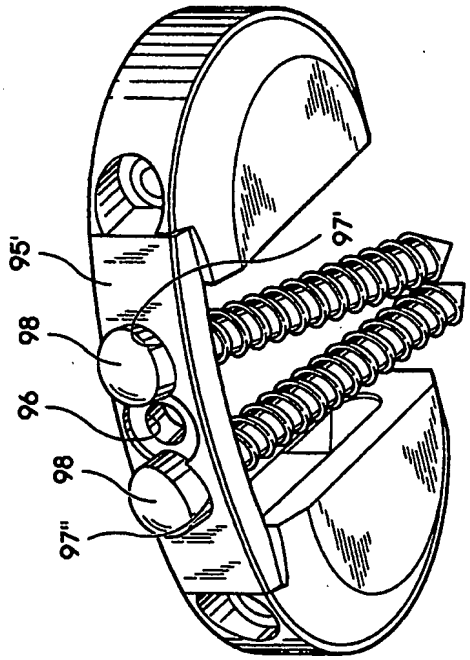


Fig. 25

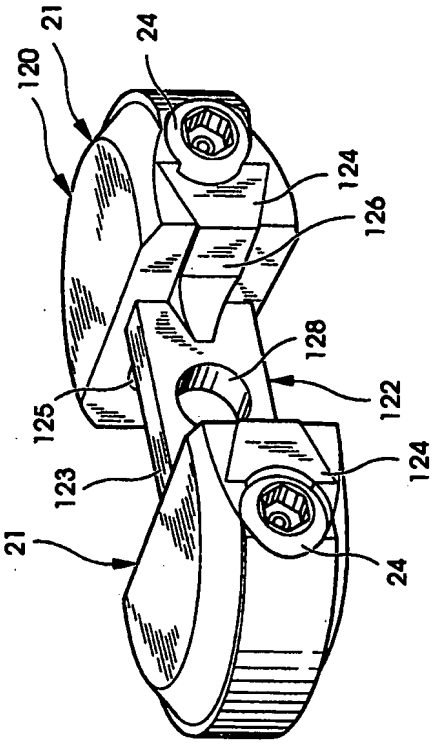


Fig. 26

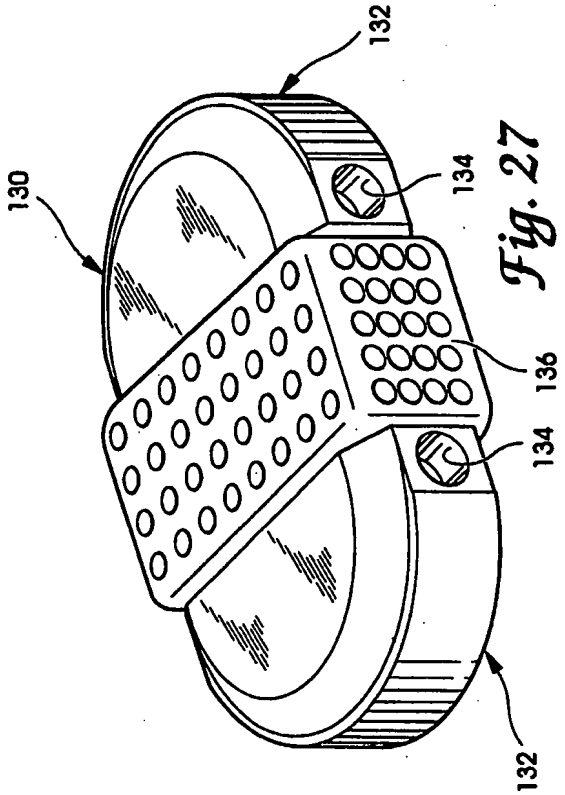


Fig. 27

23 shown in FIG. 1. In an alternative embodiment, depicted in FIG. 26, only a single central spacer is utilized. Specifically, the interbody fusion device 120 of FIG. 26 includes a pair of lateral spacers 21 as previously described. However, instead of a posterior and an anterior central spacer, the device 120 includes a single midline central spacer 122 formed by a body 123 spanning between the lateral spacers and by elongated dovetail arms 124 formed at the opposite ends of the body 123. Each of the dovetail arms 124 is configured to be slidably received within the interlock channels 34 of the lateral spacers. Each of the arms 124 includes a posterior portion 125, configured to contact the end walls 35 (FIG. 6) of the lateral spacers. The arms further include an anterior portion 126 against which the fixation screws 24 act to hold the assembly together.

The body 123 of the midline central spacer 122 includes a guide bore 128 defined therethrough which is used as described above to guide the in situ insertion of the spacer 122 between the two lateral spacers 21. The fusion device 120 is thus assembled in a manner similar to the previous device 20, except that only one central spacer is inserted. Bone graft material is preferably placed between the separated lateral spacers 21 prior to and after insertion of the midline central spacer 122, to completely fill the cavity defined by the interbody fusion device 120. Alternatively, the central spacer 122 can be configured so that the body 123 is situated at the anterior or posterior face of the lateral spacers 21, as shown in FIG. 25, for example. When configured in this manner, the arms 124 of the spacer would not include anterior and posterior portions 125 and 126, but would include but a single extension that would traverse the entire length of the interlocking channel 34 from the anterior face to the end wall 35.

In yet another embodiment of the invention, a fusion device 130 includes a pair of modified lateral spacers 132. These lateral spacers do not include the dovetail interlocking channel 34 of the prior described spacers. The spacers 132 are, however, provided with guide bores 134 in their anterior face to receiving an insertion rod 80 (FIG. 14) used to insert and spread the lateral spacers 132 within the intradiscal space. The fusion device 130 includes a bone graft insert 136 shaped to be received within the intradiscal space between the separated lateral spacers 132. The device 130 is maintained in its assembled configuration by the natural tension of the disc annulus surrounding the components. Alternatively, the bone graft insert 136 can be shaped to include dovetail arms, in the manner of the central spacers 22 and 23, for engagement with interlocking channels 34 of lateral spacers 21.

Insertion instrumentation has been previously described to accomplish the piecemeal construction of the assembled interbody fusion device through a minimally invasive portal. A further embodiment of insertion instrumentation is illustrated in FIG. 28, and more particularly a spreader assembly 100. The spreader assembly 100 provides a means for spreading the lateral spacers 21 apart within the disc space and to that extent is intended as a substitute for manually manipulated spreader rods 80 previously described, while still locating off of similar spreader rods.

Specifically, the spreader assembly 100 includes a pair of spreader bars 101 which engage at their ends with spreader rod portions 102. The spreader rod portions 102 are configured similar to the end of the rods 80 for reception within the screw bores 37 of the lateral spacers 21. Two spreader bars, 101_R and 101_L are provided, each of which are bent at an obtuse angle distal from the spreader rod portions 102. The opposite end of each of the bent bars 101_R and 101_L is mounted to a respective guide body 103 or 104.

Mounted to and projecting from the left guide body 104 is a guide rod 106, and mounted to the right guide body is an advancement rack 108. The advancement rack 108 extends through a rectangular bore defined in the left guide body 104 so that the guide body 104 can slide over the rack. The guide rod 106 terminates without engaging the right guide body 103 to acts as a stop or limit to the relative movement of the left guide body 104 toward the right body 103. The advancement rack 108 includes a number of teeth 109, configured in the form of a rack and pinion system, to engage teeth 112 of a pinion gear 111. A knob 113 is provided for rotating the pinion gear 111 to advance the rack 108 relative to the guide rod 106. As the rack 108 moves relative to the rod 106, it pushes the right guide body 103 (to which the rack is connected) away from the left guide body 104 (to which the rod is connected).

In the illustrated embodiment, the pinion gear 111 includes teeth 112 around the entire circumference of the gear, which means that some of the teeth will contact the toothless surface of the guide rod 106. Alternatively, the pinion gear 111 can include teeth around only a portion of the gear's circumference. Since the lateral spacers 21 need only be separated enough to permit introduction of the two central spacers, the relative travel between the two spreader bars 101_R and 101_L, and likewise the guide bodies 103 and 104, is limited. As a consequence, the amount of travel of the rack 108 and the corresponding rotation of the pinion gear 111 are also limited. In the preferred embodiment, about one-half rotation of the pinion gear 111 accomplishes the necessary separation of the two lateral spacers 21, so that the teeth 112 need only extend about half way around the gear.

Once the rack and pinion have been properly manipulated to separate the two lateral spacers 21, the posterior central spacer 22 can be introduced by way of the guide rod 85. The bend in the two spreader bars 101 provided clearance to manipulate the central spacer 22 and rod 85 between the bars. The anterior central spacer 23 can be assembled in a similar mariner, after which the spreader assembly 100 is removed from the surgical site.

While the invention has been illustrated and described in detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character, it being understood that only the preferred embodiments have been shown and described and that all changes and modifications that come within the spirit of the invention are desired to be protected.

What is claimed is:

1. An interbody fusion device configured for introduction into an intradiscal space defined by a disc annulus between two adjacent vertebrae, the intradiscal space defining a predetermined area relative to the adjacent vertebrae, the interbody fusion device comprising:

a pair of lateral spacers, each having opposite endplate faces adapted to contact each of the adjacent vertebrae when said lateral spacers are within the intradiscal space, and each having a side face defining a channel therein; and

a first central spacer having opposite faces oriented toward each of the adjacent vertebrae when said

first central spacer is within the intradiscal space, and further having opposite ends, each of said opposite ends configured to be slidably received within said channel in a corresponding one of said lateral spacers,

wherein said pair of lateral spacers and said first central spacer are sized for individual introduction into the intradiscal space for assembly within the intradiscal space with said opposite ends of said first central spacer engaged within said channel in said corresponding one of said lateral spacers.

2. The interbody fusion device of claim 1, wherein said endplate faces of each of said pair of lateral spacers and said opposite faces of said first central spacer each define an area that is substantially less than the area of the intradiscal space.

3. The interbody fusion device of claim 1, wherein said first central spacer is elongated with a length between said opposite ends, said length being sized such that said lateral spacers are adjacent the disc annulus when said first central spacer is assembled with each of said pair of lateral spacers.

4. The interbody fusion device of claim 1, further comprising:

an elongated second central spacer having second opposite faces oriented toward each of the adjacent vertebrae and second opposite ends configured to be slidably received within said channel in a corresponding one of said lateral spacers, and

wherein when said second central spacer is assembled with said lateral spacers and said first central spacer within the intradiscal space a cavity is defined by said side face of each of said lateral spacers and said first and second central spacers, said cavity sized for introduction of bone graft material therein.

5. The interbody fusion device of claim 4, wherein:

said channel in each of said lateral spacers has a channel length;

said first central spacer has a first pair of arms defined at each of said opposite ends, said first pair of arms configured to be slidably received within said channel in a corresponding one of said lateral spacers to extend along a first portion of said channel length;

said second central spacer has a second pair of arms defined at each of said second opposite ends, said second pair of arms configured to be slidably received within said channel in a corresponding one of said lateral spacers to extend along a remaining portion of said channel length; and

each of said first pair of arms contacts a corresponding one of said second pair of arms within said channel in a corresponding one of said lateral spacers to maintain a predetermined spacing between said first and second central spacers thereby defining said cavity.

6. The interbody fusion device of claim 5, wherein:

said channel in each of said lateral spacers has an end wall at one end of said channel length and an opening at an opposite end of said channel length for introduction of the corresponding first and second arms of said first and second central spacers; and

said device further includes clamping means at said opposite end of said channel length for clamping said corresponding first and second arms within a corresponding channel, said clamping means bearing against said second central spacer to clamp said second pair of arms against said first pair of arms and said first pair of arms against said end wall of said corresponding channel.

7. The interbody fusion device of claim 6, wherein:

each of said lateral spacers defines a threaded bore adjacent said channel; and

said clamping means includes a threaded fastener having an enlarged head at one end for engaging said first central spacer when said fastener is threaded into said bore.

8. The interbody fusion device of claim 5, wherein:

said channel in each of said lateral spacers and each of said first and second pair of arms are configured for interlocking engagement to prevent removal of the corresponding axis from the corresponding channels in any direction other than along said channel length.

9. The interbody fusion device of claim 8, wherein said channel in each of said lateral spacers is a dovetail channel and each of said first and second pair of arms is configured as a dovetail.

10. The interbody fusion device of claim 1, wherein:

said channel in each of said lateral spacers has a channel length; and

said first central spacer includes an elongated arm at each of said opposite ends, each of said arms being configured to be slidably received within said channel and each having a length substantially equal to said channel length.

11. The interbody fusion device of claim 10, wherein said elongated arm at each of said opposite ends of said first central spacer includes a posterior portion disposed between said central spacer and one end of said channel and an anterior portion disposed between said central spacer and the opposite end of said channel.

12. The interbody fusion device of claim 10, wherein:

said channel in each of said lateral spacers has an end wall at one end of said channel length and an opening at an opposite end of said channel length for introduction of the corresponding arm at said opposite ends of said first central spacer; and

said device further includes clamping means at said opposite end of said channel length and bearing against said first central spacer for clamping said corresponding arm against said end wall of said corresponding channel.

13. The interbody fusion device of claim 12, wherein:

each of said lateral spacers defines a threaded bore adjacent said channel; and

said clamping means includes a threaded fastener having an enlarged head at one end for engaging said first central spacer when said fastener is threaded into said bore.

14. The interbody fusion device of claim 10, wherein:

said channel in each of said lateral spacers and said arm at said opposite ends of said first central spacer are configured for interlocking engagement to prevent removal of the corresponding arms from the corresponding channels in any direction other than along said channel length.

15. The interbody fusion device of claim 14, wherein said channel in each of said lateral spacers is a dovetail channel and said arm at each of said opposite ends of said first central spacer is configured as a dovetail.

16. A device for introducing an interbody fusion device into an intradiscal space defined by a disc annulus between two adjacent vertebrae, in which the interbody fusion device includes a pair of lateral spacers

adapted to contact each of the adjacent vertebrae and a central spacer for mating engagement with the central spacers within the intradiscal space, each of the pair of lateral spacers and central spacer sized for individual introduction into the intradiscal space for assembly therein,

said device comprising:

a pair of spreader rods, one for each of said pair of lateral spacers, each having means for engaging a respective one of said lateral spacers, and each sized to extend outside the patient when engaging said lateral spacers disposed within the intradiscal space; and

means for manipulating said pair of spreader rods outside the patient to move said lateral spacers apart within the intradiscal space.

17. The device of claim 16, wherein said means for manipulating includes a rack and pinion gear assembly engaged between said pair of spreader bars so that rotation of said pinion gear along said rack causes said pair of spreader bars to move apart.

18. The interbody fusion device of claim 1, wherein:

said first central spacer defines a bore therethrough, said bore having an axis angled toward an adjacent vertebra when said first central spacer is disposed within the intradiscal space; and

said device further comprises a bone screw sized for introduction through said bore in said central spacer to engage the adjacent vertebra and thereby anchor said first central spacer to the vertebra.

* * * * *

39/5/88 (Item 88 from file: 348) **Links**
EUROPEAN PATENTS

00379670

Device for the resection of a femoral bone for the application of knee articulation prostheses.
Einrichtung zur Resektion eines Oberschenkelknochens fur den Einbau von Kniegelenkprothesen.
Dispositif pour la resection d'un os femoral pour l'installation des protheses d'articulation de genou.

Patent Assignee:

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  (applicant designated states: AT;BE;CH;DE;ES;FR;GB;GR;LI;NL;SE)

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	Country	Number	Kind	Date	
Patent	EP	340176	A2	19891102	(Basic)
Application	EP	89830103		19890307	
Priorities	IT	8820402		19880429	

Designated States:
AT; BE; CH; DE; ES; FR; GB; GR; LI; NL;
SE;

International Patent Class (V7): A61F-002/46; ; Abstract EP 340176 A2

There is **discosed** a device for the resection of the front,rear and transverse portions of the head of a femur in order to apply to the knee an articulation prosthesis.

This device essentially comprises a first parallelepipedal body adapted to be affixed to the distal part of the femur in order to resect the femur bone at the front and rear thereof,and a second body, cooperating with the first so as to transversely resect the distal part.

(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) Publication number: **0 340 176 A2**

(12) EUROPEAN PATENT APPLICATION

(21) Application number: **89830103.1**

(22) Date of filing: **07.03.89**

(51) Int. Cl.[4]: **A 61 F 2/46**

(30) Priority: **29.04.88 IT 2040288**

(43) Date of publication of application:
02.11.89 Bulletin 89/44

(84) Designated Contracting States:
AT BE CH DE ES FR GB GR LI NL SE

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(54) Device for the resection of a femoral bone for the application of knee articulation prostheses.

(57)

DEVICE FOR THE RESECTION OF A FEMORAL BONE FOR THE APPLICATION OF KNEE ARTICULATION PROSTHESES

There is discosed a device for the resection of the front,rear and transverse portions of the head of a femur in order to apply to the knee an articulation prosthesis.

This device essentially comprises a first parallelepipedal body adapted to be affixed to the distal part of the femur in order to resect the femur bone at the front and rear thereof,and a second body, cooperating with the first so as to transversely resect the distal part.

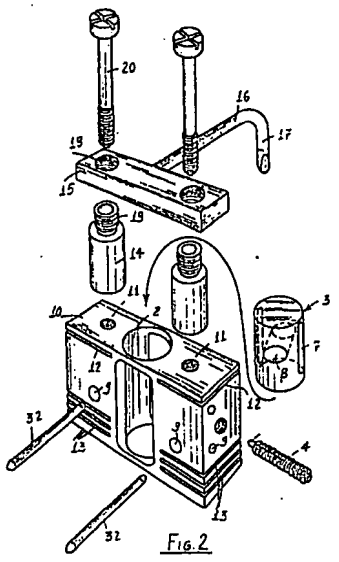

FIG. 2

EP 0 340 176 A2

Bundesdruckerei Berlin

the top face of the body 1 through screws 20 engaging in the holes 11 formed on said face.

Thus, by suitably changing the height of the spacer cylindrical members 14,it will be possible to adjust the spacing between the small plate 18 and body 11,depending on the requirements.

The device further comprises a second shaped body 21,also having a substantially parallelepipedal shape,provided with a cantilever rectangular plate 22.

This plate 22 is provided with a central hole 23 and two side holes 24 arranged at and sized based on the throughgoing hole 2 and counterbore 11 formed on the top face of said body 1.

Through said second shaped body 21 there are moreover formed at least two cross throughgoing holes 25,as well as a pair of slots 26 which are mutually coplanar and perpendicular to the mentioned plate 22,and a pair of slanted slots 27.

For properly using the subject device, it is necessary to form,at the start of the operation, a hole 29 at the center of the infracondyl groove,by using a suitable pointed tool 28.

Then,by means of an endomidullar femoral nail 30,inserted into the hole of the bush 3 end into said hole 29,the body 1 is displaced so sa to contact the head of the femur.

Successively,the plate 15 is affixed on the top face of said body and the body,by sliding with respect to the bush (which is coupled to the mentioned endomidullar nail),fits to the biassing force exerted by the end portion of the lug 16 on the neck of the femur.

After this operation,the body 1 is further restrained on the head of the femur,by means of a twice bent small plate 31,engaged in one of the slots 13 said body being locked by means of a pair of pins 32 which,through the holes 9,are driven in said head of the femur.

Then,the plate 15,with the related spacer members,and the small plate 31 are removed and the front and rear portions of the femur are resected as is shown in figure 7.

After this operation,the body 21 is affixed on the top face of the first shaped body 1 by means of screws 33 and said body 21 is locked on the front portion of the head of the femur,by means of pins 34 engaging the holes 25.

Then,the body 1 is removed and,by using the guiding slots 26 and 27,there are carried out the operations of transversely resecting the femoral condyles (as shown in figure 9) and the bevel 35.

Finally the prosthesis 36 is fitted on the head of the femur and locked thereon by forcing the pins 37,provided with annular ridges 38,into the holes 39 left by the pins 32.

From the above disclosure it should be apparent that the device according to the invention fully achieves the intended task and objects.

While the invention has been disclosed and illustrated with reference to a preferred embodiment thereof,it should be apparent that the disclosed embodiment is susceptible to several modifications and variations ,all of which will come within the spirit and scope of the appended claims.

Claims

1- A femoral resection device characterized in that said device essentially comprises a first shaped body,having a substantially parallelepipedal shape, adapted to be affixed on the distal part of a femur, for the resection of the front and rear portions thereof,and a second shaped body,cooperating with the first shaped body and coupled thereto for transversely resecting said distal part of said femur.

2- A femoral resection device according to claim 1, characterized in that said first shaped body is provided,at its middle cross section,with a throughgoing hole,open on the two main walls of said first body and in which there is engaged a cylindrical bush restrained therein by a pair of threaded stems engaging in corresponding threaded holes longitudinally formed of said first shaped body.

3- A femoral resection device according to the preceding claims,characterized in that said threaded stems are provided with an end portion provided for engaging in a slot or groove formed along a perimetrical portion of said bush and extending parallel to the longitudinal axis of said bush,said bush being moreover provided with a throughgoing hole the axis of which forms a given angle with the cross axis of said bush,said angle depending on the inclination of the diaphysis-femur axis with respect to a vertical axis.

4- A femoral resection device,according to one or more of the preceding claims,characterized in that said first shaped body is provided with two cross throughgoing holes and,at the top face thereof,with two threaded counterbores,in said first shaped body there being moreover formed,on the sides of said central throughgoing hole,and at the top,two coplanar slots which are parallel to the top face of said first body, and,at the bottom,at least three pairs of further slots which are also coplanar but slightly downwardly slanted with respect to the rear face of said first shaped body provided for contacting said femur.

5- A femoral resection device according to one or more of the preceding claims,characterized in that to said top face of said first body there is coupled, through the interposition of spacer cylindrical members, a small plate having a lug the end free portion of which is right angle bent,said small plate being coupled to said first shaped body by means of two threaded holes and using,as said cylindrical spacer members, two tubular members provided with a top threaded ridge provided for engaging in said holes.

6- A femoral resection device,according to one or more of the preceding claims,characterized in that said device further comprises a second shaped body,of substantially parallelepipedal shape,provided with a cantilever rectan-

gular plate including a central hole and two side holes.

7- A femoral resection device,according to one or more of the preceding claims,characterized in that in said second shaped body there are formed at least two cross throughgoing holes as well as a pair of slots coplanar with one another and perpendicular to said plate,and at least a pair of slanted slots.

8- A device according to any of the preceding claims and substantially as disclosed and illustrated for the intended task and objects.

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(54) Device for the resection of a femoral bone for the application of knee articulation prostheses.

(57)

DEVICE FOR THE RESECTION OF A FEMORAL BONE FOR THE APPLICATION OF KNEE ARTICULATION PROSTHESES

There is discosed a device for the resection of the front,rear and transverse portions of the head of a femur in order to apply to the knee an articulation prosthesis.

This device essentially comprises a first parallelepipedal body adapted to be affixed to the distal part of the femur in order to resect the femur bone at the front and rear thereof,and a second body, cooperating with the first so as to transversely resect the distal part.

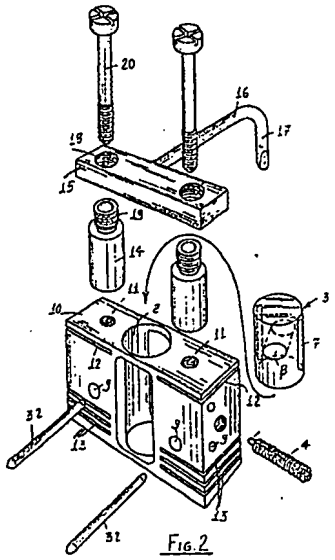

FIG. 2

EP 0 340 176 A2

Bundesdruckerei Berlin

Description

BACKGROUND OF THE INVENTION

The present invention relates to a device for the resection of a femoral bone for the application of a knee articulation prosthesis.

As is known,frequently the knee articulation must be replaced by an artificial prosthesis,because, for example,of arthritis,tumoral deseases and the like.

In this case,the head portion of the femur must be resected in order to properly fit thereon a femoral prosthesis.

SUMMARY OF THE INVENTION

The task of the present invention is to provide a device for the resection of a femoral bone which is specifically designed and arranged to apply several types of different femoral prosthesis.

Within the scope of this task,a main object of the present invention is to provide such a femoral resection device which can be easily fitted to the inclination of the diaphysis-femur axis of the patient, with respect to a vertical axis.

Another object of the present invention is to provide such a femoral resection device which is construction-wise very simple,can be simply operated and is very reliable in oparation.

According to one aspect of the present invention,the above mentioned task and objects,as well as yet other objects,which will become more apparent hereinafter,are achieved by a femoral resection device characterized in that said device essentially comprises a first shaped body,having a substantially parallelepipedal shape,adapted to be affixed on the distal part of a femur for the resection of the front and rear portions thereof,and a second shaped body,cooperating with the first shaped body and coupled thereto for transversely resecting said distal part of said femur.

BRIEF DESCRIPTION OF THE DRAWINGS

Further characteristics and advantages of the device according to the present invention,will become more apparent from the following detailed description of a preferred embodiment thereof,which is illustrated,by way of an indicative but not limitative example,in the figures of the accompanying drawings,in which:

figure 1 shows a first shaped body included in the device according to the invention,said body including a lug which can operate as a reference member and contact the portion of a femur bone upstream of the distal part thereof;

figure 2 is an exploded view illustrating the first shaped body;

figures 3 to 7 illustrate a possible procedure for applying the above first shaped body on the front portion of the femur for resecting the front and rear portion thereof;

figures 8 and 9 schematically illustrate a possible procedure for using a second shaped body included in the resection device according to the invention;

and

figures 10 and 11 illustrate a femoral prosthesis respectively in its disengaged condition and in its condition engaged on the head of the femoral bone.

DESCRIPTION OF THE PREFERRED EMBODIMENT

With reference to the figures of the accompanying drawings,the femoral resection device according to the present invention comprises a first shaped body 1, of parallelepipedal shape,provided,at its middle transversal or cross-section,with a throughgoing hole 2,which is open on the two main walls of this shaped body.

Within this hole 2 there is engaged a cylindrical bush 3,which is restrained in said hole by means of a pair of threaded stems 5 longitudinally formed in the body 1.

Said threaded stems are provided with and end piece 6 provided for engaging in a groove 7 which is formed along a perimetrical portion of said bush, and extend parallel to the longitudinal axis of said bush.

This bush,moreover,is provided with a throughgoing hole 8 the axis of which forms,with the transversal axis of said bush,a suitable angle which depends on the inclination of the diaphysis-femur axis of the patient with respect to a vertical axis.

The first shaped body 1 is moreover provided with two cross throughgoing holes 9 and,at the top face thereof 10,with two threaded counterbores indicated at 11.

In this connection,it should be apparent that,in said first shaped body there are furthermore formed,on the sides of the central throughgoing hole 2,at the top thereof,two coplanar slots 12 which are parallel to the top face of said first body,whereas, at the bottom of said first body,there are provided at least three pairs of slots 13,also coplanar but slightly downwardly with respect to the rear face of said first body provided for contacting the head of the femur.

In particular,to the mentioned top face of the body 1 there is coupled,through the interposition of two spacer cylindrical members 14,a small plate 15 provided with a lug 16 the end 17 of which is right angle bent.

Preferably,this small plate is coupled to the body 1 by means of two threaded holes 18 formed therethrough and by using,as the spacer cylindrical members, two tubular members provided with a top ridge 19,also threaded,provided for engaging in said holes.

Then,the thus formed assembly will be affixed on

the top face of the body 1 through screws 20 engaging in the holes 11 formed on said face.

Thus, by suitably changing the height of the spacer cylindrical members 14,it will be possible to adjust the spacing between the small plate 18 and body 11,depending on the requirements.

The device further comprises a second shaped body 21,also having a substantially parallelepipedal shape,provided with a cantilever rectangular plate 22.

This plate 22 is provided with a central hole 23 and two side holes 24 arranged at and sized based on the throughgoing hole 2 and counterbore 11 formed on the top face of said body 1.

Through said second shaped body 21 there are moreover formed at least two cross throughgoing holes 25,as well as a pair of slots 26 which are mutually coplanar and perpendicular to the mentioned plate 22,and a pair of slanted slots 27.

For properly using the subject device, it is necessary to form,at the start of the operation, a hole 29 at the center of the infracondyl groove,by using a suitable pointed tool 28.

Then,by means of an endomidullar femoral nail 30,inserted into the hole of the bush 3 end into said hole 29,the body 1 is displaced so sa to contact the head of the femur.

Successively,the plate 15 is affixed on the top face of said body and the body,by sliding with respect to the bush (which is coupled to the mentioned endomidullar nail),fits to the biassing force exerted by the end portion of the lug 16 on the neck of the femur.

After this operation,the body 1 is further restrained on the head of the femur,by means of a twice bent small plate 31,engaged in one of the slots 13 said body being locked by means of a pair of pins 32 which,through the holes 9,are driven in said head of the femur.

Then,the plate 15,with the related spacer members,and the small plate 31 are removed and the front and rear portions of the femur are resected as is shown in figure 7.

After this operation,the body 21 is affixed on the top face of the first shaped body 1 by means of screws 33 and said body 21 is locked on the front portion of the head of the femur,by means of pins 34 engaging the holes 25.

Then,the body 1 is removed and,by using the guiding slots 26 and 27,there are carried out the operations of transversely resecting the femoral condyles (as shown in figure 9) and the bevel 35.

Finally the prosthesis 36 is fitted on the head of the femur and locked thereon by forcing the pins 37,provided with annular ridges 38,into the holes 39 left by the pins 32.

From the above disclosure it should be apparent that the device according to the invention fully achieves the intended task and objects.

While the invention has been disclosed and illustrated with reference to a preferred embodiment thereof,it should be apparent that the disclosed embodiment is susceptible to several modifications and variations ,all of which will come within the spirit and scope of the appended claims.

Claims

1- A femoral resection device characterized in that said device essentially comprises a first shaped body,having a substantially parallelepipedal shape, adapted to be affixed on the distal part of a femur, for the resection of the front and rear portions thereof,and a second shaped body,cooperating with the first shaped body and coupled thereto for transversely resecting said distal part of said femur.

2- A femoral resection device according to claim 1, characterized in that said first shaped body is provided,at its middle cross section,with a throughgoing hole,open on the two main walls of said first body and in which there is engaged a cylindrical bush restrained therein by a pair of threaded stems engaging in corresponding threaded holes longitudinally formed of said first shaped body.

3- A femoral resection device according to the preceding claims,characterized in that said threaded stems are provided with an end portion provided for engaging in a slot or groove formed along a perimetrical portion of said bush and extending parallel to the longitudinal axis of said bush,said bush being moreover provided with a throughgoing hole the axis of which forms a given angle with the cross axis of said bush,said angle depending on the inclination of the diaphysis-femur axis with respect to a vertical axis.

4- A femoral resection device,according to one or more of the preceding claims,characterized in that said first shaped body is provided with two cross throughgoing holes and,at the top face thereof,with two threaded counterbores,in said first shaped body there being moreover formed,on the sides of said central throughgoing hole,and at the top,two coplanar slots which are parallel to the top face of said first body, and,at the bottom,at least three pairs of further slots which are also coplanar but slightly downwardly slanted with respect to the rear face of said first shaped body provided for contacting said femur.

5- A femoral resection device according to one or more of the preceding claims,characterized in that to said top face of said first body there is coupled, through the interposition of spacer cylindrical members, a small plate having a lug the end free portion of which is right angle bent,said small plate being coupled to said first shaped body by means of two threaded holes and using,as said cylindrical spacer members, two tubular members provided with a top threaded ridge provided for engaging in said holes.

6- A femoral resection device,according to one or more of the preceding claims,characterized in that said device further comprises a second shaped body,of substantially parallelepipedal shape,provided with a cantilever rectan-

gular plate including a central hole and two side holes.

7- A femoral resection device,according to one or more of the preceding claims,characterized in that in said second shaped body there are formed at least two cross throughgoing holes as well as a pair of slots coplanar with one another and perpendicular to said plate,and at least a pair of slanted slots.

8- A device according to any of the preceding claims and substantially as disclosed and illustrated for the intended task and objects.

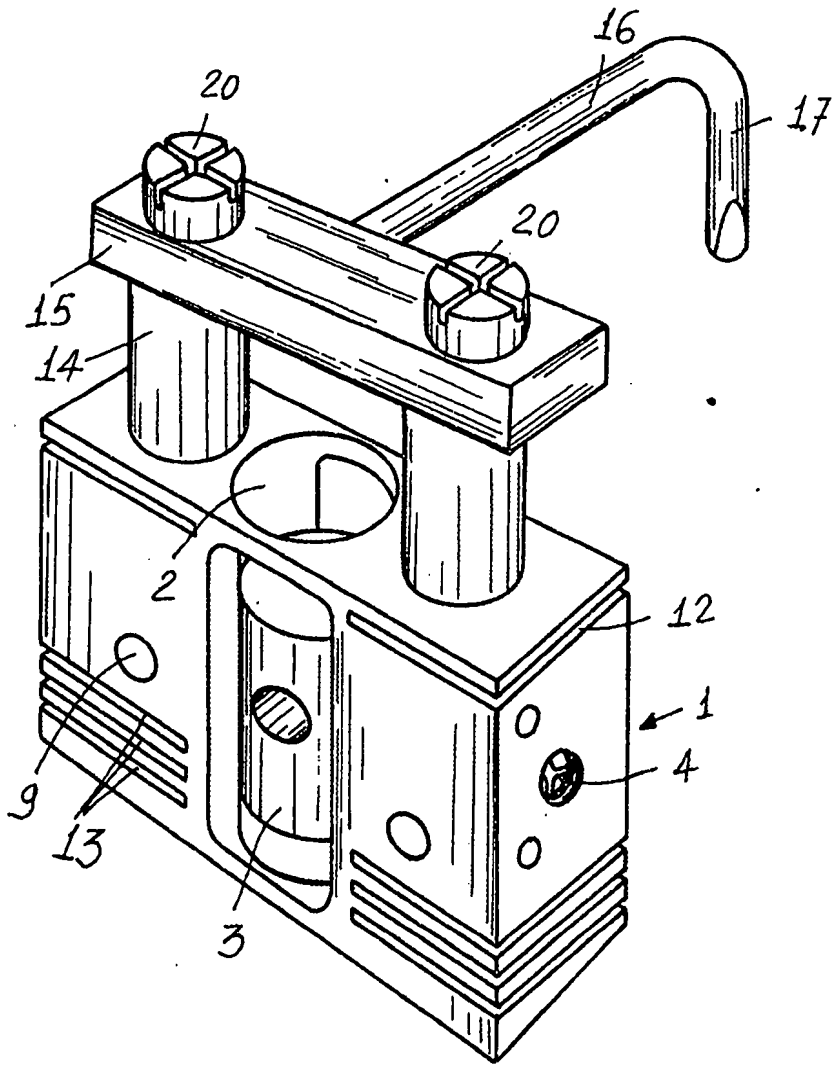

FIG. 1

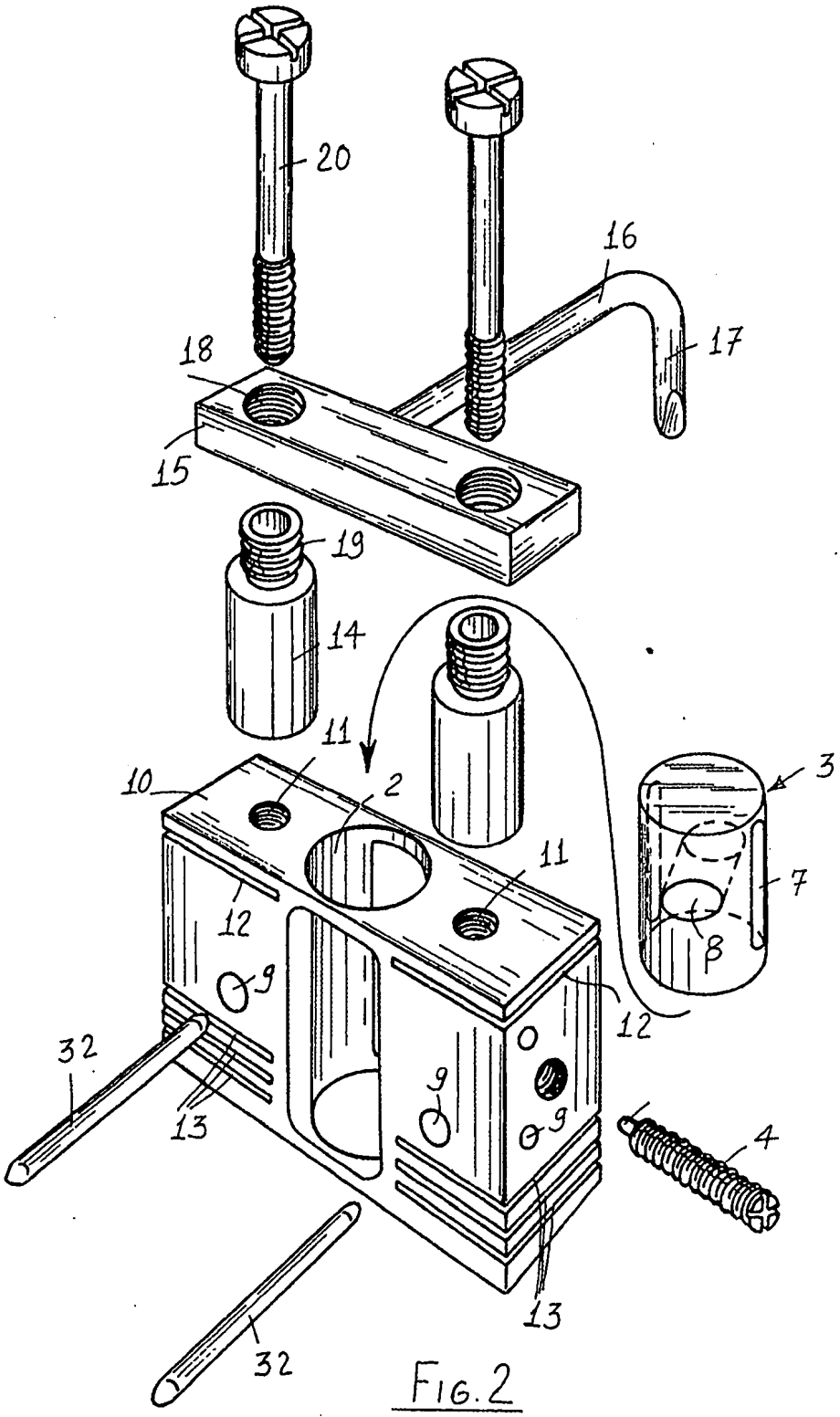

FIG. 2

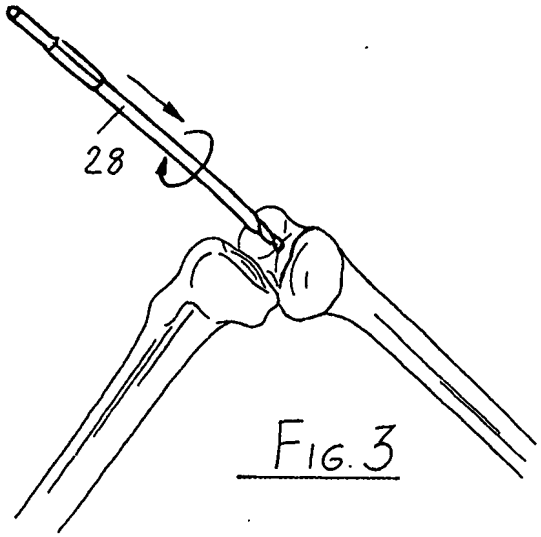

FIG. 3

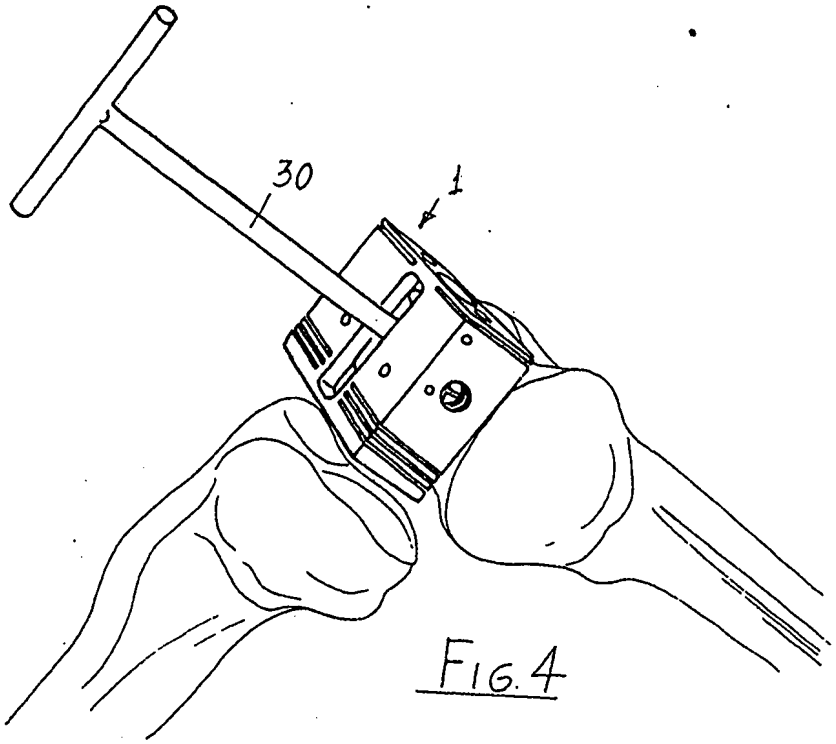

FIG. 4

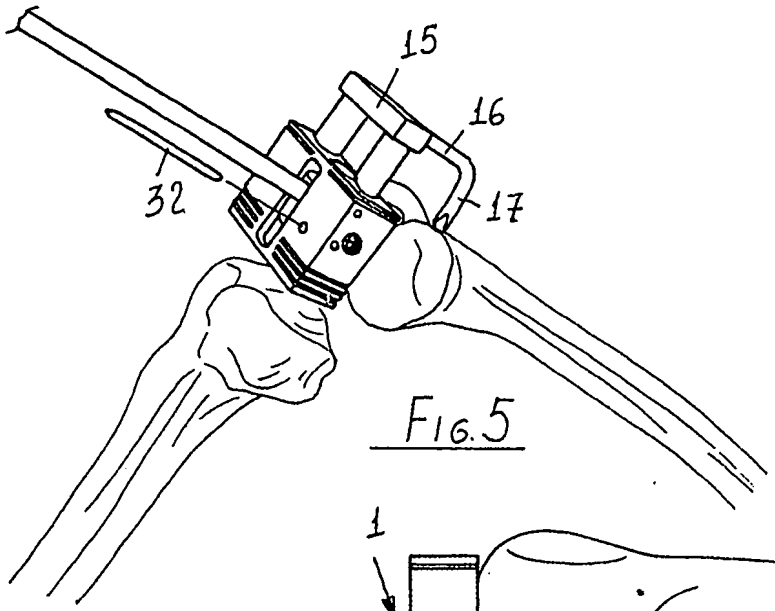

FIG. 5

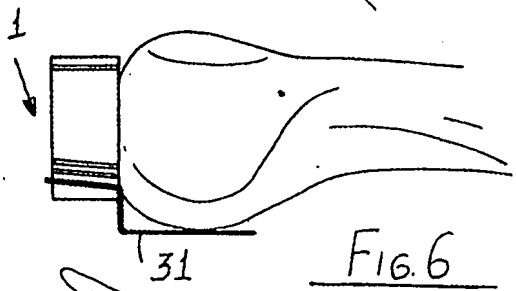

FIG. 6

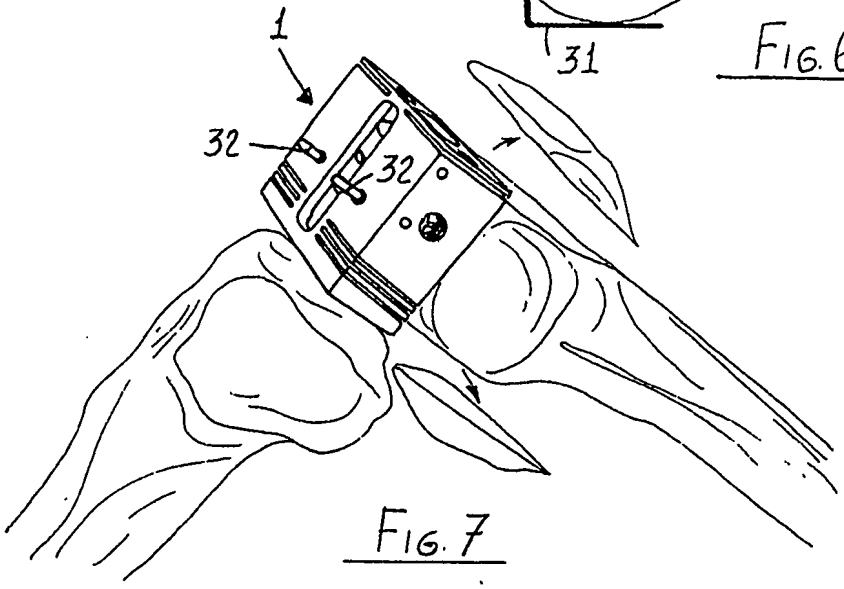

FIG. 7

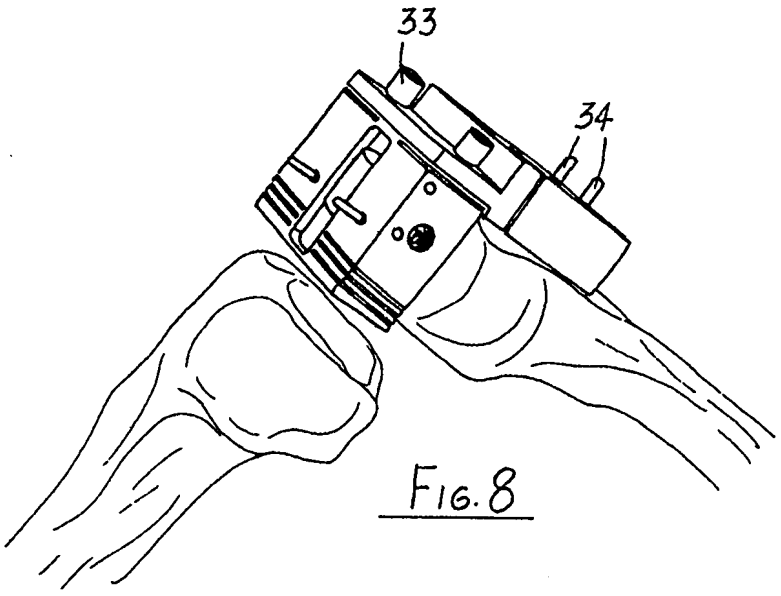

FIG. 8

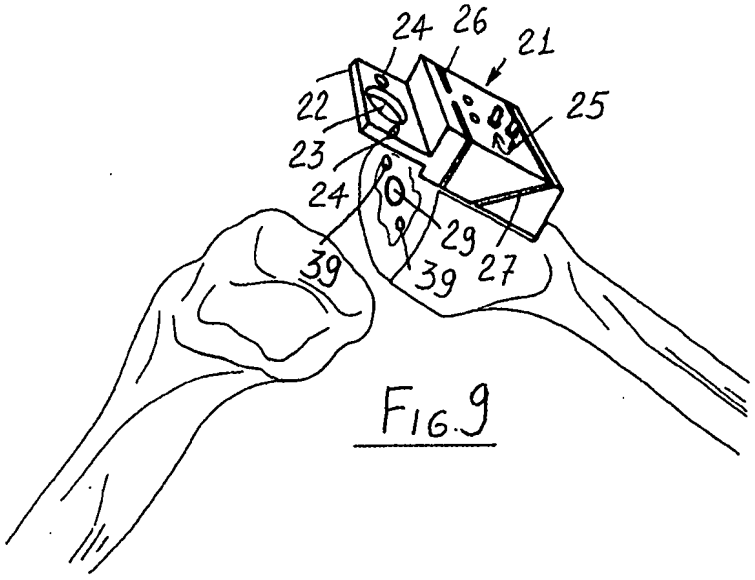

FIG. 9

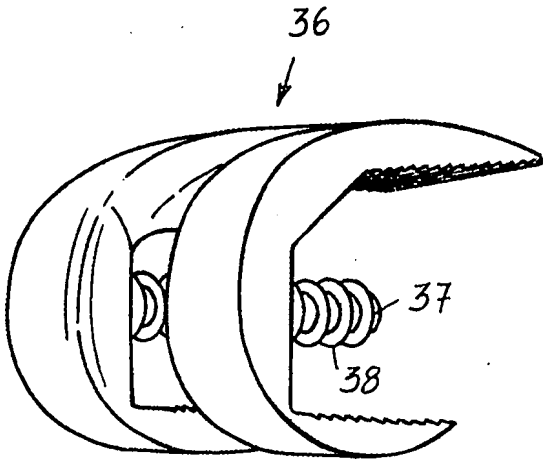

FIG. 10

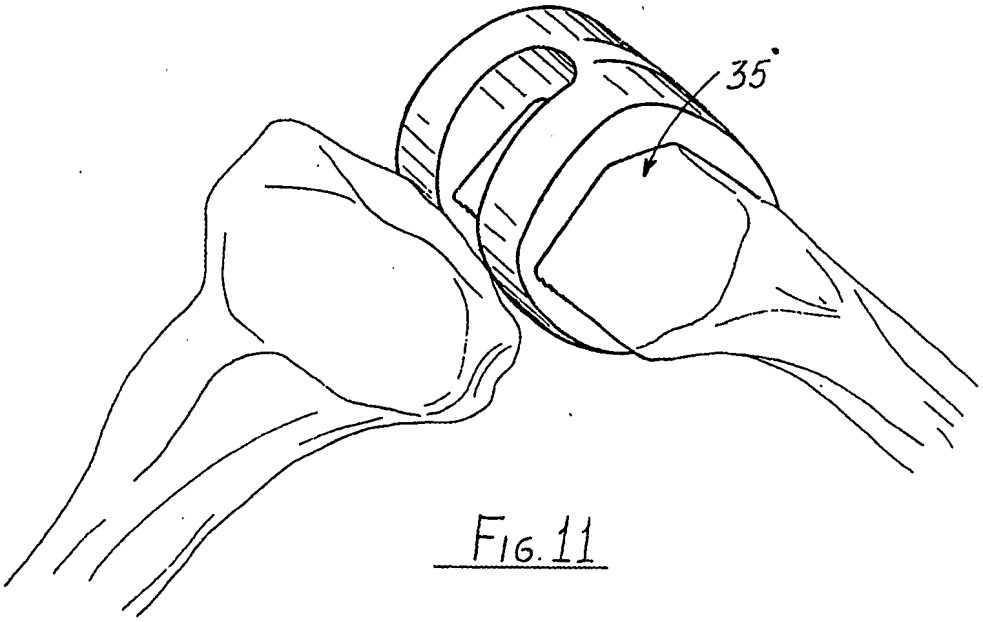

FIG. 11

Set	Items	Postings	Description
S1	1687994	6505683	S BLOCK? ? OR SPACER? OR WEDGE? OR SHIM? OR BUSHING? OR DONUT? OR TORUS? OR GROMMET? OR DOUGHNUT?
S2	461121	1394189	S SQUARE? OR RECTANG? OR QUADRILAT?
S3	1335016	6952141	S RESILIENT? OR PLIANT? OR RUBBER? OR ELASTOMER? OR COMPRESS?BL? OR FLEXIB? OR FLEX????
S4	624356	2381822	S ELASTIC? OR DUCTIL? OR TRACTIL? OR SPRINGY OR SPRINGI? OR SPONGIFORM? OR LATEX?
S5	229748	1377568	S (SHOCK? OR VIBRAT? OR ENERGY? OR BLOW? OR FORCE? OR OSCILLAT? OR IMPACT? OR MOTION? OR MOVEMENT?)(2N)(STOP? OR ARREST? OR SQUELCH? OR DAMPEN? OR ABSORB? OR INHIBIT? OR MINIM? OR ISOLAT? OR DAMPER? OR ATTENUAT?)
S6	5839796	19138016	S INTERMEDIAT? OR SANDWICH? OR INTERSPER? OR BETWEEN? OR INTERSPAC? OR INTERSPAT? OR INTERVEN? OR INTERSTIT?
S7	862082	3327952	S INTER OR BETWIXT? OR INTERADJACENT? OR INTERJACEN? OR CENTRAL?
S8	27777	133813	S INTERLEAV? OR INTERLAMINA? OR INTERSHUFFL? OR INTERSPERS?
S9	3359	29399	S INTERSPIN? OR INTERVERTEB?
S10	3389	29460	S INTERVERTEBRA? OR INTERDISC? OR INTERDISK? OR INTERSPINE? OR INTERSPINOUS?
S11	2927546	12926880	S SPINE? OR VERTEBRA? OR SPINAL OR SPINOUS? OR DISK? OR DISC? OR SPIN?()APOPHY? OR LUMBAR?(2N)(SACRUM? OR SACRAL?)
S12	39939	233447	S OSTE? OR OSSO? OR OSTO? OR OSSE? OR ENDOSTE? OR PERIOSTE?
S13	120675	753997	S BONE? ? OR ORTHOPED? OR ORTHOPAED? OR OSSEOUS? OR SKELET?
S14	851019	3987416	S IMPLANT? OR PROSTHE? OR SHIM???? OR ENDOPROSTHE? OR INSERT? ? OR SPACER? OR EMPLANT? OR INFIX? OR REPLACEMENT? OR OSTEOSYNTHE?
S15	371537	2987812	S (S1:S2(10N)S3:S5) OR (S1:S2(5N)S9:S13) OR (S1:S2(5N)(S6:S8 OR S14))
S16	90944	870505	S PLATE? OR PANEL? OR FLAT()PIECE? OR BRACKET? OR PLANK? OR PANE? ? OR BASEPLATE?
S17	1851	16700	S METALPLATE? OR METALSHEET? OR METAL?()SHEET? OR BACKPLATE? OR FACEPLATE?
S18	3573	25494	S (THREAD? OR HELIC? OR HELIX? OR COIL? OR SPIRAL?)(2N)(CONNECT?R? OR ROD OR RODS OR POLE? OR SLEEV? OR SHEATH? OR SHAFT? OR NAIL? OR TACK? ? OR ANCHOR? OR RETAINER? OR PEG OR PEGS OR STAKE?)
S19	46302	341043	S SCREW? OR BRAD? ? OR RIVET? OR PIN OR PINS OR CONNECT?R? OR FIXAT?R?
S20	256923	2498831	S TWO OR TWIN OR DOUBLE OR PAIR OR TWOFOLD OR TWOSOME OR DUAL? OR 2 OR 2ND OR SECOND?
S21	36739	207482	S (OPPOSING OR OPPOSITE)()SIDE? ? OR TWOPIECE? OR TANDEM? OR SIAMES? OR DUPLE? OR DUO OR COUPLE?
S22	104754	669735	S MATE? OR MATCH? OR MALE?(3N)FEMALE? OR MORTIS?(3N)TENON? OR DOVETAIL? OR DOVE()TAIL?
S23	8956	44576	S FORMFIT? OR INTERLOCK? OR COMPLEMENTARY? OR FORM()(FIT OR FITTED OR FITTING OR FITS) OR CONCAV?(3N)CONVEX?
S24	15528	82553	S MESH? OR INTERMESH? OR INTERLINK? OR INTERCONNECT? OR INTER()(LOCK? OR SECT? OR LINK? OR JOIN? OR FIT OR FITS OR FITTED OR FITTING?) OR INTERFIT?
S25	632	2274	S (FIT OR FITTED OR FITTING OR FITS)()TOGETHER OR SYNCHROMESH? OR ENMESH?
S26	84221	631881	S HOLE? OR THROUGHHOLE? OR THRUHOLE? OR PERFORAT? OR CHANNEL? OR TUNNEL? OR PASSAGE?
S27	26936	79178	S IC=(G06F? OR A61B? OR C07D? OR B01J? OR A61F? OR A61M?)
S28	35943	56878	S MC=(A12? OR D09?)
S29	51350	1004362	S S15 AND (S16:S17 OR S18:S19)(10N)S20:S21
S30	2578	129299	S S29 AND S26(7N)(S1:S5) AND S18:S19(7N)S26
S31	414	31094	S S30 AND S18:S19(7N)S22:S25
S32	134	14094	S S31 AND (S9:S13 OR S27:S28)
S33	111	9197	S S31 AND S1:S2(7N)S3:S5
S34	98	10832	S S31 AND S1:S2(7N)S6:S8 AND (S1:S2 OR S6:S8)(7N)S16:S17
S35	269	31847	S S32:S34
S36	144	21427	S S35 AND AC=US/PR

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S37        142       21436   S S36 AND AY=(1970:2004)/PR
S38        138       19039   S S36 NOT AY=(2005:2007)/PR
S39        125       10652   S S35 NOT S36
S40        118       11464   S S39 AND AY=1970:2004
S41        120        9803   S S39 NOT AY=2005:2007
S42        266       50103   S S37:S38 OR S40:S41
S43        269       62925   S S42 OR S35
S44        269       51080   IDPAT (sorted in duplicate/non-duplicate order)
S45        269       51080   IDPAT (primary/non-duplicate records only)
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[File 347] **JAPIO** Dec 1976-2006/Dec(Updated 070403)

[File 350] **Derwent WPIX** 1963-2007/UD=200740

**File 350: DWPI has been enhanced to extend content and functionality of the database. For more info, visit http://www.dialog.com/dwpi/.*

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39/5/219 (Item 219 from file: 349) **Links**
PCT FULLTEXT

00736990

METHOD AND APPARATUS FOR INTERVERTEBRAL IMPLANT ANCHORAGE

PROCEDE ET APPAREIL D'ANCRAGE D'**IMPLANT INTERVERTEBRAL**

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Legal Representative:

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	Country	Number	Kind	Date
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Application	WO	2000US3148		20000207
Priorities	US	99259503		19990226

Designated States: (All protection types applied unless otherwise stated - for applications 2004+)

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[OA] BF; BJ; CF; CG; CI; CM; GA; GN; GW; ML; MR; NE; SN; TD; TG;

[AP] GH; GM; KE; LS; MW; SD; SL; SZ; TZ; UG; ZW;

[EA] AM; AZ; BY; KG; KZ; MD; RU; TJ; TM;

Main International Patent Classes (Version 7):

IPC	Level
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Fulltext word count: 7990

English Abstract:

Methods and devices are provided for **intervertebral implant** anchorage. An **implantable** device for insertion into an intradiscal section **between** adjacent **vertebrae** is provided. The **implantable** device includes at least one anchor **plate** which comprises a plate member sized to be positioned within an intradiscal section between adjacent vertebrae and a plurality of anchoring elements extending from a surface of the plate member, each anchoring element including a distal portion capable of being introduced into the vertebra through the vertebral end plate; and an intradiscal component coupled to the anchor plate.

French Abstract:

US006113638A

United States Patent [19]

Williams et al.

[11] Patent Number: 6,113,638

[45] Date of Patent: Sep. 5, 2000

[54] METHOD AND APPARATUS FOR INTERVERTEBRAL IMPLANT ANCHORAGE

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[21] Appl. No.: **09/259,503**

[22] Filed: **Feb. 26, 1999**

[51] **Int. Cl.**[7] **A61F 2/44**; A61B 17/70

[52] **U.S. Cl.** **623/17**; 606/61

[58] **Field of Search** 623/17, 16; 606/61

[56] **References Cited**

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Assistant Examiner—Michael B. Priddy
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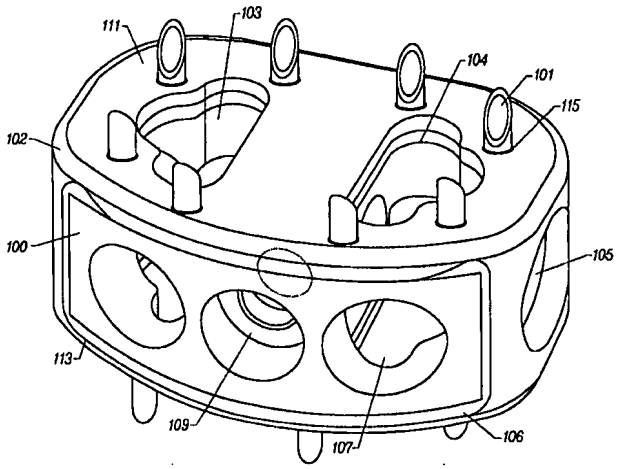
[57] **ABSTRACT**

Methods and devices are provided for intervertebral implant anchorage. An implantable device for insertion into an intradiscal section between adjacent vertebrae is provided. The implantable device includes at least one anchor plate which comprises a plate member sized to be positioned within an intradiscal section between adjacent vertebrae and a plurality of anchoring elements extending from a surface of the plate member, each anchoring element including a distal portion capable of being introduced into the vertebra through the vertebral end plate; and an intradiscal component coupled to the anchor plate.

32 Claims, 20 Drawing Sheets



anchoring elements extending from a surface of the plate member, each anchoring element including a distal portion capable of being introduced into an end plate of one of the adjacent vertebrae;

a second anchor plate comprising of a plate member sized to be positioned within the space and a plurality of anchoring elements extending from a surface of the plate member, each anchoring element including a distal portion capable of being introduced into an end plate of one of the adjacent vertebrae; and

causing the anchoring elements on the first and second anchor plates to be introduced into the vertebrae through the vertebral end plate.

As illustrated in FIG. **8A**, the anchoring elements **142** of first **(132)** and second **(134)** anchor plates of an implantable device **130** illustrated in FIGS. **7A–E** are introduced into the vertebrae by applying a force with fixation screws **146** to the anchor plates approximately perpendicular to a plane of the end plate such as E4 and E5 of vertebrae L4 and L5, respectively. FIG. **8B** shows that the implantable device **130** is anchored between the adjacent vertebrae L4 and L5 by the anchoring elements **142** penetrating vertebral end plates E4 and E5.

As also illustrated in FIGS. **8A** and **8B**, the anchoring elements **142** are introduced into the vertebrae L4 and L5 without rotating the anchor elements **142**. Screwing an element into a vertebra can cause the vertebra to splinter.

As also illustrated in FIGS. **8A** and **8B**, the anchoring elements are introduced into the vertebrae without first creating one or more holes in the vertebrae for the anchoring elements.

In yet another embodiment according to the method, the implantable device includes an intradiscal component. Examples of intradiscal components include an intradiscal spacer, a cage, and an artificial disc.

In yet another embodiment according to the method, the implantable device includes first and second anchor plates, inserting including positioning the first anchor plate adjacent a first of the adjacent vertebra and positioning the second anchor plate adjacent a second of the adjacent vertebra, and causing the anchoring elements to be introduced into the vertebrae including causing anchoring elements on the first anchor plate to be introduced into the first vertebra and causing anchoring elements on the second anchor plate to be introduced into the second vertebra.

FIGS. **9A–9C** illustrate a method for introducing a device according to the present invention by an anterior approach. FIG. **10** illustrates a guide employed in the method.

As illustrated in FIG. **10**, a guide **160** includes a sleeve **162** and at least two lips **164** that can be inserted intradiscally to maintain the height of the disc space. The sleeve **162** is preferably cylindric with an elliptical cross section **167**, and has multiple vents **161** and **163** for proper circulation of air. A replacement disc **168** can be introduced into the intradiscal space through the sleeve **162** in a direction **165** approximately along a longitudinal axis of the sleeve.

FIGS. **9A–D** illustrate a method for implanting a device via anterior approach. As illustrated in FIG. **9A**, an intervertebral disc **180** to be replaced is accessed through a laparoscopic anterior approach. The disc **180** is exposed anteriorly, i.e. beneath the chest and abdomen of the patient. After the disc **180** to be removed has been identified, the disc is surgically removed. To prepare the adjacent vertebrae to receive the disc replacement **168**, cartilage on the end plates of the adjacent vertebrae is removed by an instrument **181** following known procedures. Care should be taken not to violate the end plates. One or two spacers **172** are then inserted into the intradiscal space, with the adjacent vertebrae being separately distracted by a wedge so as to allow proper location of the spacer **172**. The spacer **172** also serves as a measurement of the height of the disc space.

As illustrated in FIG. **9B**, a guide **160** (described in regard to FIG. **10**) is put over the spacers **172** with the lips **164** of the sleeve **162** replacing the spacers **172**. The spacers **172** are then removed from the disc space. As illustrated in FIG. **9C**, once the disc replacement guide sleeve **160** is properly positioned, an implantable device such as a replacement disc **168**, is inserted through the sleeve **162** into the interdiscal space. As illustrated in FIG. **9D**, a wedge spreader **174** is then inserted into a channel **173** defined by the implantable device to distract the anchor plates **176** and introduce anchoring elements **178** on the anchor plates **176** into the end plates of the adjacent vertebrae.

While the present invention is disclosed by reference to the various embodiments and examples detailed above, it should be understood that these examples are intended in an illustrative rather than limiting sense, as it is contemplated that modifications will readily occur to those skilled in the art which are intended to fall within the scope of the present invention.

What is claimed is:

1. An implantable device for insertion into an intradiscal section between adjacent vertebrae, the device comprising:

an anchor plate comprising a plate member sized to be positioned within an intradiscal section between adjacent vertebra and a plurality of anchoring elements extending from a surface of the plate member, each anchoring element including a distal portion capable of being introduced into an end plate of one of the adjacent vertebrae; and

an intradiscal component coupled to the anchor plate, the intradiscal component including a cage having a first side for positioning adjacent a first vertebra and a second side for positioning adjacent a second vertebra, the first side including a plurality of holes through which the anchoring elements on the anchor plate can be positioned, and the second side including at least one hollow bore.

2. An implantable device according to claim **1** wherein the anchor plate includes at least 3 anchoring elements.

3. An implantable device according to claim **1** wherein the anchor plate has a non-smooth surface.

4. An implantable device according to claim **1** wherein the anchor plate has at least one hollow bore.

5. An implantable device according to claim **1** wherein at least one of the anchoring elements includes a lumen.

6. An implantable device according to claim **1** wherein at least one of the anchoring elements includes a lumen at least 0.5 mm in diameter.

7. An implantable device according to claim **1** wherein the anchoring elements extend substantially perpendicular from the anchor plate.

8. An implantable device according to claim **1** wherein the anchoring elements extend angularly from the anchor plate.

9. An implantable device according to claim **1** wherein the anchoring elements have at least one curved distal end.

10. An implantable device according to claim **1** wherein the anchoring elements have a smooth outer surface.

11. An implantable device according to claim **1** wherein the anchoring elements do not include a thread for screwing the anchoring element into the vertebrae.

12. An implantable device according to claim **1** wherein the intradiscal component includes an artificial disc.

13. An implantable device according to claim **1** wherein the intradiscal component further includes at least one channel adapted to receive bone graft material therein.

14. An implantable device according to claim 1 wherein the intradiscal component includes a spacer.

15. An implantable device according to claim 1 wherein the anchoring elements include a distal portion capable of piercing an end plate of a vertebrae which does not already have holes for the anchoring elements.

16. An implantable device for insertion into an intradiscal space between adjacent vertebra, the device comprising:

a first anchor plate comprising a plate member sized to be positioned within an intradiscal section between adjacent vertebra and a plurality of anchoring elements extending from a surface of the plate member, each anchoring element including a distal portion capable of being introduced into an end plate of one of the adjacent vertebrae;

a second anchor plate comprising a plate member sized to be positioned within an intradiscal section between adjacent vertebra and a plurality of anchoring elements extending from a surface of the plate member, each anchoring element including a distal portion capable of being introduced into an end plate of one of the adjacent vertebrae; and

an intradiscal component coupled to the first and second anchor plates, the intradiscal component including a cage having a first side for positioning adjacent a first vertebra and a second side for positioning adjacent a second vertebra, the first side including a plurality of holes through which the anchoring elements on the first anchor plate can be positioned, and the second side including a plurality of holes through which the anchoring elements on the second anchor plate can be positioned.

17. An implantable device according to claim 16 wherein the intradiscal component includes an artificial disc.

18. An implantable device according to claim 16 wherein the intradiscal component further includes at least one channel adapted to receive bone graft material therein.

19. An implantable device according to claim 16 wherein the intradiscal component includes a spacer.

20. An implantable device according to claim 16 wherein the anchoring elements include a distal portion capable of piercing an end plate of a vertebrae which does not already have holes for the anchoring elements.

21. A kit for forming an implantable device for insertion into an intradiscal section between adjacent vertebrae, the kit comprising:

an intradiscal component sized to be positioned within an intradiscal section between first and second adjacent vertebrae, the intradiscal component comprising a cage having a first side for positioning adjacent the first vertebra and a second side for positioning adjacent the second vertebra, the first side of the cage including a plurality of holes; and

an anchor plate comprising a plate member and a plurality of anchoring elements extending from a surface of the plate member, the anchor plate being positionable within the cage and the anchoring elements being extendable out of the cage through the plurality of holes.

22. A kit according to claim 21 wherein the anchoring elements are adapted to be extended out of the cage in a direction approximately perpendicular to a plane of an end plate of the first vertebra.

23. A kit according to claim 21 wherein the intradiscal component further includes at least one channel adapted to receive bone graft material therein.

24. A kit according to claim 21 wherein the intradiscal component further includes at least one channel adapted to receive a device for causing the anchoring elements to be introduced into an end plate of the first vertebra.

25. A kit according to claim 21 wherein the anchoring elements include a distal portion capable of piercing an end plate of a vertebrae which does not already have holes for the anchoring elements.

26. A kit for forming an implantable device for insertion into an intradiscal section between adjacent vertebrae, the kit comprising:

an intradiscal component sized to be positioned within an intradiscal section between first and second adjacent vertebrae, the intradiscal component comprising a cage having a first side for positioning adjacent the first vertebra and a second side for positioning adjacent the second vertebra, the first and second sides of the cage including a plurality of holes;

a first anchor plate comprising a plate member and a plurality of anchoring elements extending from a surface of the plate member, the first anchor plate being positionable within the cage and the anchoring elements being extendable out of the cage through the plurality of holes on the first side of the cage; and

a second anchor plate comprising a plate member and a plurality of anchoring elements extending from a surface of the plate member, the second anchor plate being positionable within the cage and the anchoring elements being extendable out of the cage through the plurality of holes on the second side of the cage.

27. A kit according to claim 26 wherein the anchoring elements of the first and second anchor plates are adapted to be extended out of the cage in a direction approximately perpendicular to end plate surfaces of the first and second vertebrae.

28. A kit according to claim 26 wherein the intradiscal component further includes at least one channel adapted to receive bone graft material therein.

29. A kit according to claim 26 wherein the intradiscal component further includes at least one channel adapted to receive a device for causing the anchoring elements to be introduced into end plates of the first and second vertebrae.

30. A kit according to claim 26 wherein the anchoring elements include a distal portion capable of piercing an end plate of a vertebrae which does not already have holes for the anchoring elements.

31. A method for anchoring an implantable device within an intradiscal section between adjacent vertebrae, the method comprising:

creating a space between the adjacent vertebrae;

inserting into the space created an implantable device comprising

a first anchor plate comprising a plate member sized to be positioned within the space and a plurality of anchoring elements extending from a surface of the plate member, each anchoring element including a distal portion capable of being introduced into an end plate of one of the adjacent vertebrae,

a second anchor plate comprising a plate member sized to be positioned within the space and a plurality of anchoring elements extending from a surface of the plate member, each anchoring element including a distal portion capable of being introduced into an end plate of one of the adjacent vertebrae, and an intradiscal component coupled to the first and second anchor plates; and

causing the anchoring elements on the first and second anchor plates to be introduced into the adjacent vertebrae through each of the vertebral end plates by applying a force to the anchor plate approximately perpendicular to a plane of the end plate so as to cause the anchoring elements on the anchor plate to be introduced into the vertebra through the vertebral end plate.

32. A method for anchoring an implantable device within an intradiscal section between adjacent vertebrae, the method comprising:

creating a space between the adjacent vertebrae;

inserting into the space created an implantable device comprising

a first anchor plate comprising a plate member sized to be positioned within the space and a plurality of anchoring elements extending from a surface of the plate member, each anchoring element including a distal portion capable of being introduced into an end plate of one of the adjacent vertebrae,

a second anchor plate comprising a plate member sized to be positioned within the space and a plurality of anchoring elements extending from a surface of the plate member, each anchoring element including a distal portion capable of being introduced into an end plate of one of the adjacent vertebrae, and an intradiscal component coupled to the first and second anchor plates; and

causing the anchoring elements on the first and second anchor plates to be introduced into the adjacent vertebrae through each of the vertebral end plates without first creating one or more holes in the vertebrae for the anchoring elements.

* * * * *

39/5/185 (Item 185 from file: 349) **Links**
PCT FULLTEXT

01023681

BIOACTIVE SPINAL IMPLANTS AND METHOD OF MANUFACTURE THEREOF
IMPLANTS SPINAUX BIOACTIFS ET PROCEDE DE FABRICATION

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	Country	Number	Kind	Date
Patent	WO	200353290	A1	20030703
Application	WO	2002US39184		20021209
Priorities	US	2001339871		20011212
	US	2002256566		20020926

Designated States: (All protection types applied unless otherwise stated - for applications 2004+)

[EP] AT; BE; BG; CH; CY; CZ; DE; DK; EE; ES;
FI; FR; GB; GR; IE; IT; LU; MC; NL; PT;
SE; SI; SK; TR;

[OA] BF; BJ; CF; CG; CI; CM; GA; GN; GQ; GW;
ML; MR; NE; SN; TD; TG;

[AP] GH; GM; KE; LS; MW; MZ; SD; SL; SZ; TZ;
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[EA] AM; AZ; BY; KG; KZ; MD; RU; TJ; TM;

Main International Patent Classes (Version 7):

IPC	Level
A61F-002/44	Main

Publication Language: English
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Fulltext word count: 17984

English Abstract:

A spinal implant comprising an anterior side (60), posterior side (70), a pair of side walls (40) which are generally outwardly curved; top (20) and bottom (30) surfaces each including a plurality of projections (25) ; and a handling feature comprising at least one of a pair of side recesses (43, 53) for receiving a manipulator and a front recess (63), the handling feature facilitating handling and insertion of the spinal implant into an intervertebral space.

French Abstract:

La presente invention concerne un implant spinal bioactif s'utilisant en fusion cervicale, fusion intercorps lombaire anterieure (ALIF), fusion intercorps lombaire posterieure (PLIF) et fusion intercorps transforaminale (TLIF). Cet implant se distingue par des proprietes et des geometries renforcant le contact avec l'os, la stabilite, et la fusion entre corps vertebraux adjacents.

Type	Pub. Date	Kind	Text
Publication	20030703	A1	With international search report.
Publication	20030703	A1	Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.

US 20030125739A1

(19) United States

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Bagga et al. (43) Pub. Date: Jul. 3, 2003

(54) BIOACTIVE SPINAL IMPLANTS AND METHOD OF MANUFACTURE THEREOF

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(21) Appl. No.: **10/256,566**

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Related U.S. Application Data

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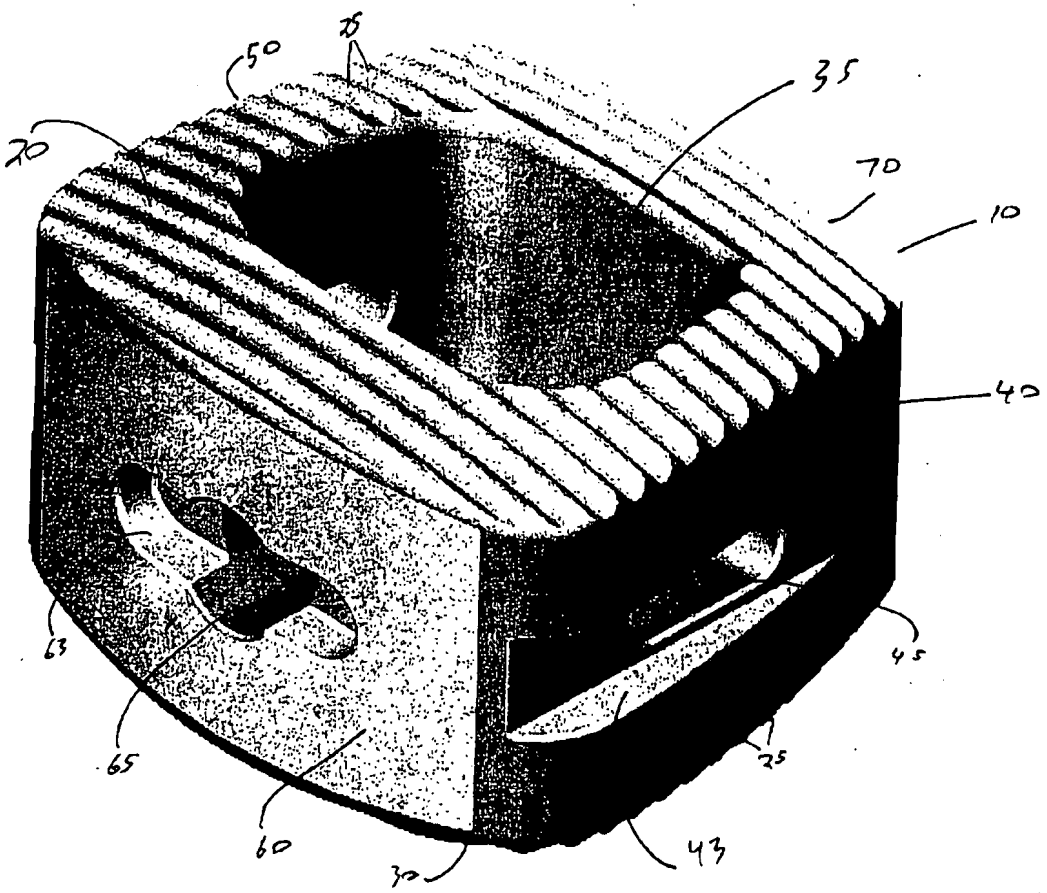
Publication Classification

(51) **Int. Cl.**[7] **A61B 17/70**

(52) **U.S. Cl.** **606/61**; 606/69; 623/17.11

(57) **ABSTRACT**

A bioactive spinal implant used in cervical fusion, Anterior Lumbar Interbody Fusion (ALIF), Posterior Lumbar Interbody Fusion (PLIF), and Transforaminal Interbody Fusion (TLIF), having properties and geometries that enhance bone contact, stability, and fusion between adjacent vertebral bodies.



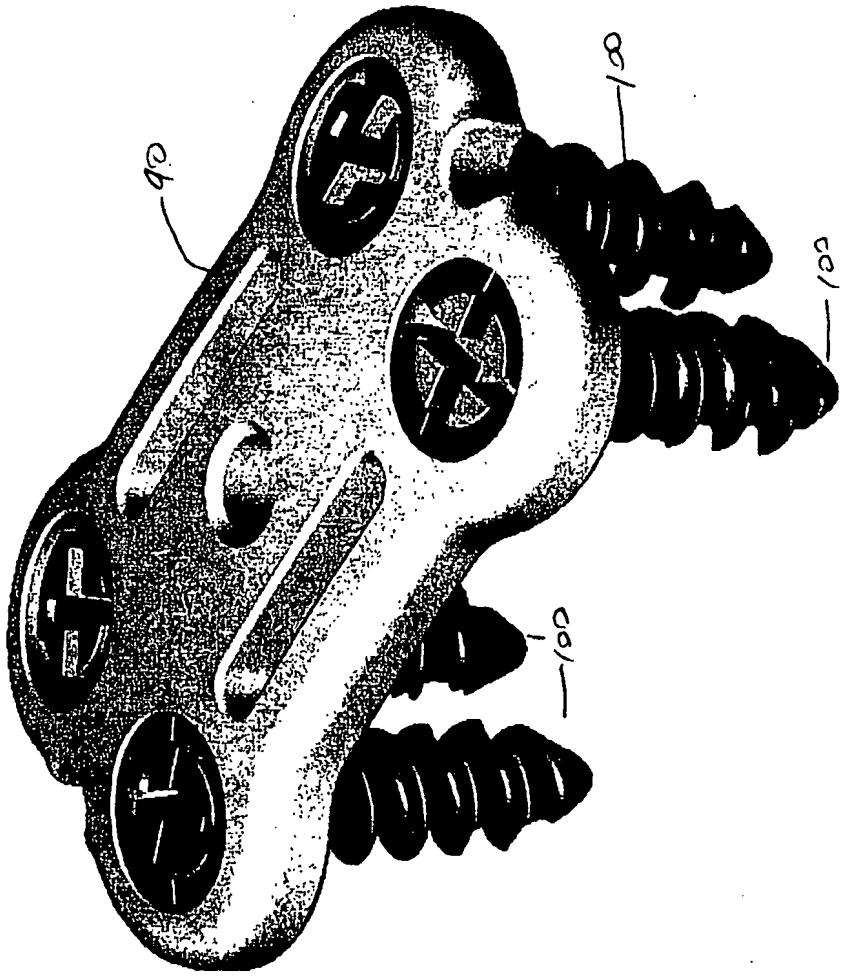


FIG 6

FIG 7

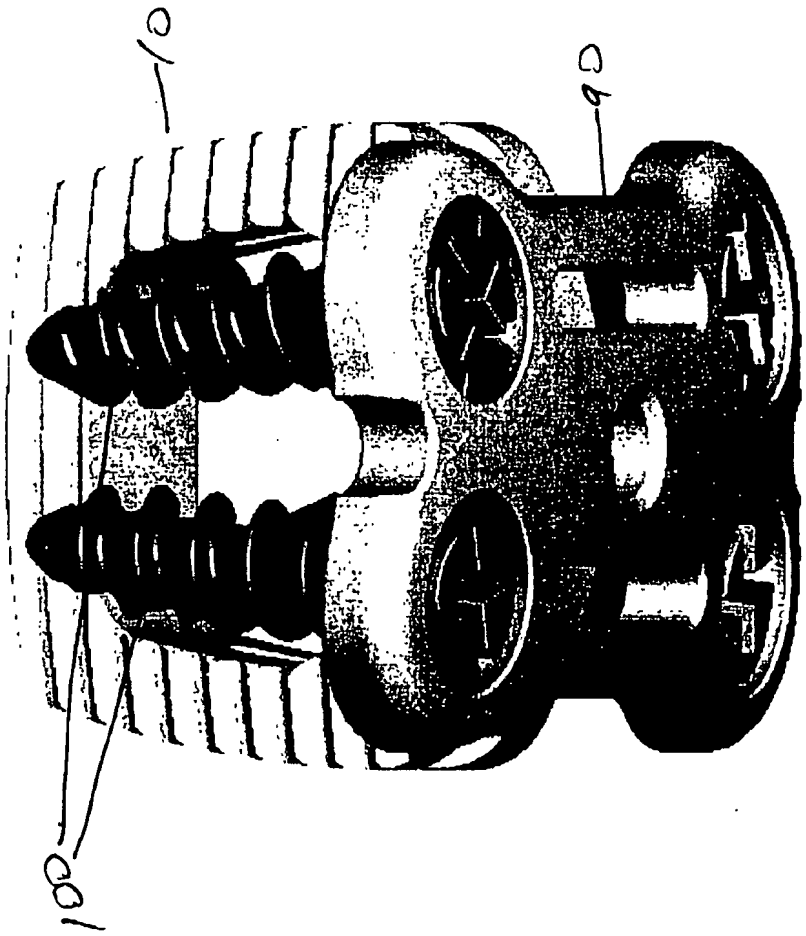
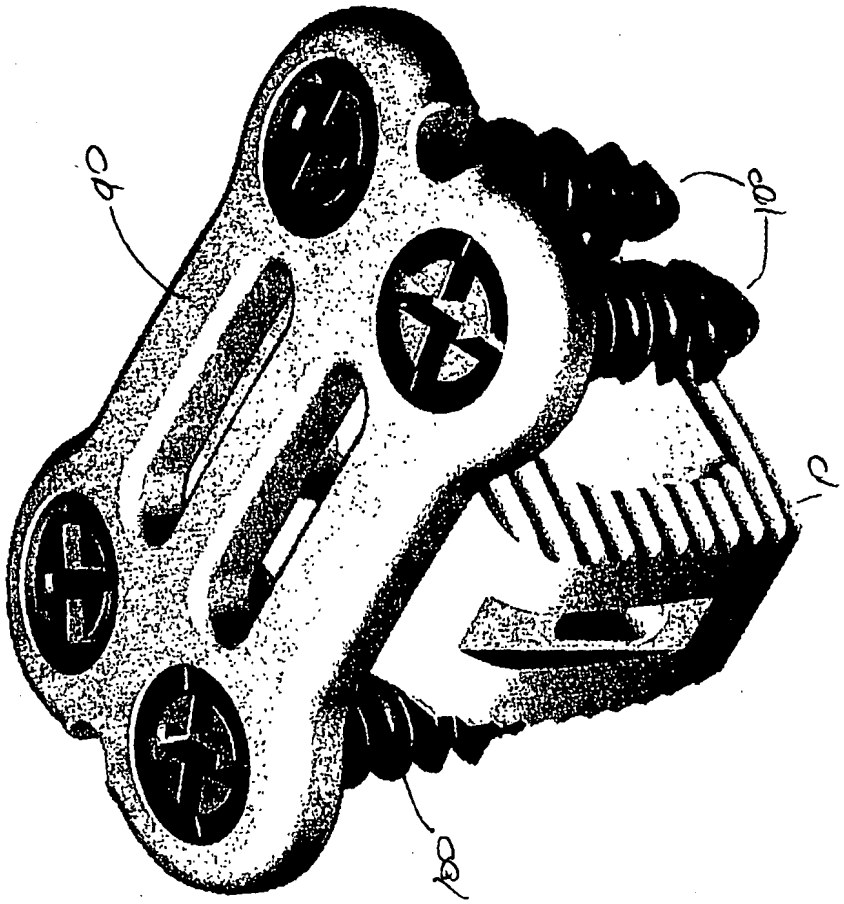


FIG 8



material to facilitate the formation of a solid fusion column within the patient's spine. One such example of such a synthetic graft material is VITOSS® Synthetic Cancellous Bone Void Filler material, which is manufactured by Orthovita, Inc. of Malvern, Pa. To foster bone fusion, the VITOSS® calcium phosphate material may be saturated with the patient's own bone marrow aspirate, or therapeutic material such as growth factor, proteins, bone marrow aspirate and other materials such as those disclosed in U.S. application Ser. No. 10/035,797, incorporated herein by reference. It should be noted that in preferred embodiments, the posterior side **70** does not have an opening therethrough. This facet of the design is a safety feature implemented to prevent leakage of graft materials placed in the major recess **35** into the spinal canal.

[0108] **FIGS. 6 through 8** show a plate **90** and fastener **100** assembly that may be used in conjunction with implant **10**. The plate and fastener assembly may facilitate fusion of adjacent vertebrae by stabilizing the implant in place between the vertebrae. Fasteners **100** may be comprised of screws, pins, nails, and the like. They are inserted into openings within plate **90** to engage the adjoining vertebral bodies. Upon insertion, one pair of fasteners is inserted in the upper vertebral body and one pair is inserted in the lower vertebral body.

[0109] **FIGS. 9 through 11** show accessories **110** and **120** that are used to connect one or more implants **10** as shown in **FIG. 11**. Accessories **110** and **120** may be used in corpectomy procedures in which the surgeon removes one or more vertebrae and needs to restore the spine to its former height. In **FIG. 9**, accessory **110** has two male ends that may engage, for example, the major recess **35** of implant **10** or the female end of accessory **120**. In **FIG. 10**, accessory **120** has a male end **123** and a female end that allows implants to be joined together as shown in **FIG. 11**. Accessories **110** and **120** may be joined together with implants **10** via snap or compression fit via one or more flexible tabs, fasteners, adhesives, or other means.

[0110] III. ALIF Implant

[0111] The bioactive material of the present invention may also be formed into an implant suitable for ALIF procedures. ALIF implant devices are generally suitable for implantation in the lumbar regions of the spine.

[0112] **FIGS. 12 through 14** depict one embodiment of the ALIF implant **130** of the present invention. Like the cervical implant of the present invention, implant **130** may be in a variety of different sizes to accommodate differences in the patient's anatomy or the location of the spine that implant **130** will be inserted. The body may substantially form an oval shape in the longitudinal cross-section. The implant is a body comprising a bioactive substance and further comprising: an anterior side **180**, a posterior side **190** opposing the anterior side **180**, and a pair of opposing sidewalls **160**, said sidewalls **160** being generally outwardly curved or generally "c-shaped." The anterior **180** and posterior **190** sides may be parallel and in others they are outwardly curved. The implant also has a top surface **140** and a bottom surface **150**, both surfaces coupled with the sidewalls **160**. Top surface **140** and the bottom surface **150** form plural projections **145** for enhancing interaction with a synthetic or natural vertebral body. At least one major recess **135** is formed in the body in communication with at least one of the top surface **140** and the bottom surface **150**.

[0113] Also in **FIGS. 12 and 14**, top **140** and bottom **150** surfaces further include a plurality of projections **145**, preferably wave-like or scalloped in shape, for gripping adjacent vertebrae. These projections share the same characteristics of the plurality of projections **25** noted in the description of the cervical implant.

[0114] **FIG. 14** illustrates one embodiment of the present invention. **FIG. 14** illustrates implant **130** having a lordotic angle: The lordotic angle can range from −20 degrees to +20 degrees.

[0115] Similar to the cervical implant **10**, the ALIF implant has a major recess **135** that forms a through-aperture. This shape maximizes contact with the cortical bone in the thoracic and lumbar regions. In preferred embodiments, the top **140** and bottom **150** surfaces are substantially identical in size and shape. The major recess **135** also maximizes the chances of fusion because graft or resorbable material may be packed within implant **10**. It should be noted that in preferred embodiments, posterior side **190** does not have an opening therethrough. This is to prevent leakage of graft materials from the major recess **135** into the spinal canal.

[0116] The implant also has a handling feature comprising recesses **147** and **157** along the top **140** and bottom **150** surfaces extending from either the anterior **180** and posterior **190** sides that act as guide rails and at least one recess **185** in the anterior or sidewalls **160** for receiving an impaction tool. **FIGS. 12 and 13** show the recesses **147** and **157** that act as guide rails. The guide rails mate with an instrument, such as a parallel distraction instrument, to aid in insertion or removal of the implant. The plurality of guide rails holds the implant securely and may allow the surgeon to insert the implant more evenly.

[0117] **FIG. 12**, shows the implant **130** having a front recess **183** used as an anti-rotation recess and a front opening **185**. The front recess **183** and opening **185** share the same characteristics as the front recess **63** and front opening **65** of the cervical implant described earlier.

[0118] **FIG. 15** provides an isometric view of an alternative embodiment **200** of the ALIF implant of the present invention. Implant **200** includes a strut **210** that divides the major recess **135** into two through-apertures to provide support during anterior impaction of the implant during insertion. A strut **210** that has the top **140** and bottom **150** surfaces with projections **145** separates the through-apertures.

[0119] **FIGS. 16 through 19** provides yet another embodiment of the present invention in which an ALIF implant **215** or implant **200** further includes a fastening feature. The fastening feature comprises at least one through-aperture **220** in communication with the anterior **180** side and either the top **140** or bottom **150** surface for insertion of fasteners **230** that communicate with a synthetic or natural vertebral body either below or above the implant. This feature includes a plurality of openings **220** on the anterior side of implant **200** for receiving fasteners **230**. Fasteners **230** may include, but are not limited to, screws, pins, nails, or any other fixation devices. In certain preferred embodiments, openings **220** are angled to allow fasteners **230** to move at varying angles up and in or down and in. An angle in some embodiments that may be preferred is below

nized. Following euthanasia, the lumbar spine was retrieved en bloc and the specimens were photographed and observed grossly.

[0203] Immediately after sectioning, the excised spinal specimens were inspected for successful fusion and structural integrity of each motion segment. The screw and washer system was removed and the cranial segments were separated from the caudal segments and the specimens photographed and observed grossly.

[0204] Specimens without sufficient structural integrity for mechanical testing were immediately prepared for histologic evaluation. Those with sufficient structural integrity were mechanical tested and then prepared for histological evaluation.

[0205] All procedures were performed in accordance with Albany Medical College's Internal Animal Care and Use Committee and Quality Assurance Unit.

[0206] Results

[0207] Bridging bone was found around the implants in all cases. In all cases, the non-destructive flexion testing supported the presence of fusion. There were no Rhakoss particulates noted, and there were no signs of adverse response to the implants. In fact, minimal scar tissue was observed.

Example 11

Manufacture of Spinal Implants

[0208] A resin blend (about 20% to about 50% of total implant composition) of urethane dimethacrylate (DUDMA), triethyleneglycol dimethacrylate (TEGDMA), initiator and stabilizer were poured into a Ross planetary mixing system (Hauppauge, N.Y.). The mixer was sealed, mixing was commenced and a vacuum was applied. After the mixer was turned off and the vacuum released, one or more fillers (about 15% to about 80% of the total implant composition) such as E-glass fibers, borosilicate fillers, silica fillers, and combeite fillers were added. Mixing was commenced and a vacuum was drawn upon the addition of each increment of filler. Once all of the fillers were incorporated into the resin, a vacuum was drawn for additional minutes. The mixture was then agitated on a vibrating table with vacuum for about 5 minutes to 60 minutes. The material was extruded into a mold cavity for molding into various bulk geometries.

[0209] The mold cavities were heated in a Despatch LFD Series oven and cured at about 40° C. to about 180° C. for a time duration of about 1 hour to 20 hours to form a molded body. Various shaped bodies or implant bodies were then formed.

[0210] The materials can also be hot extruded, injection molded, compression molded, or reacted in a mold with a catalyst other than heat.

[0211] The cylindrical stock was machined at MedSource (Laconia, N.H.) into spinal implants of the various shapes disclosed herein, having a generally anatomical shape with convex superior and inferior surfaces, lordotic angles and the like.

[0212] Those skilled in the art will appreciate that numerous changes and modifications may be made to the preferred embodiments of the invention and that such changes and modifications may be made without departing from the spirit of the invention. It is therefore intended that the appended claims cover all such equivalent variations as fall within the true spirit and scope of the invention.

What is claimed is:

1. A spinal implant comprising:

a body comprising:

an anterior side, a posterior side opposing the anterior side, and a pair of opposing side walls; the anterior side, the posterior side, and side walls joining at points that generally define, in transverse cross section, a trapezoid; said sides being generally outwardly curved;

a top surface and a bottom surface, each of the top and bottom surfaces including plural projections for enhancing interaction with a synthetic or natural vertebral body; and

a handling feature comprising at least one of a pair of elongated side recesses for receiving a manipulator and a front recess, the handling feature facilitating handling and insertion of the spinal implant into an intervertebral space.

2. The spinal implant of claim 1 wherein the generally outwardly curved sides are convex as viewed from outside said spinal implant.

3. The spinal implant of claim 1 wherein the body forms a lordotic angle of about −20 degrees to about +20 degrees.

4. The spinal implant of claim 1 wherein the height of the anterior side is greater than a height of the posterior side.

5. The spinal implant of claim 1 wherein the body substantially forms a trapezoidal shape in longitudinal cross-section.

6. The spinal implant of claim 1 wherein the projections are substantially uniform, upwardly protruding ribs.

7. The spinal implant of claim 1 wherein the projections are randomly disposed.

8. The spinal implant of claim 1 wherein the projections are substantially uniform, upwardly protruding, elongated ribs separated by concave channels.

9. The spinal implant of claim 8 wherein the projections are upwardly protruding spikes.

10. The spinal implant of claim 8 wherein the angular pitch of the projections is between 1.75 degrees to 1.9 degrees.

11. The spinal implant of claim 8 wherein the projections have a minimum depth of 0.022 inches.

12. The spinal implant of claim 8 wherein the projections have an internal radius of about 0.022 inches.

13. The spinal implant of claim 1 wherein the front recess is elongated with a major axis that is substantially transverse.

14. The spinal implant of claim 1 wherein orientation of the transverse cross section is perpendicular to the z-axis.

15. The spinal implant of claim 1 further comprising a body comprising a bioactive substance.

16. The spinal implant of claim 1 wherein the body consists entirely of bioactive material.

17. The spinal implant of claim 1 wherein the body comprises DUDMA and TEGDMA resins.

18. The spinal implant of claim 1 wherein the body comprises PEEK, carbon reinforced PEEK, carbon rein-

forced barium sulfate PEEK, resorbable PLA, PGA, PLA/PGA, PLLA, or polyethylene.

19. The spinal implant of claim 1 where in the body comprises titanium, stainless steel, or cobalt chromium.

20. The spinal implant of claim 1 wherein the handling feature consists of only the side recesses.

21. The spinal implant of claim 1 wherein the handling feature consists of only the front recess.

22. The spinal implant of claim 1 further comprising a front opening.

23. The spinal implant of claim 22 wherein the front opening is threaded.

24. The spinal implant of claim 1 wherein the handling feature includes both the side recesses and the front recess.

25. The spinal implant of claim 1 wherein the implant is in communication with other synthetic intervertebral bodies to aid in fusion of adjacent vertebrae.

26. A spinal implant comprising:

a body comprising a bioactive substance, further comprising:

sides that are generally outwardly curved in transverse cross-section;

a top surface and a bottom surface, both surfaces coupled with the sides, each one of the top surface and the bottom surface forming plural projections for enhancing interaction with a synthetic or natural vertebral body;

a major recess formed in the body in communication with at least one of the top surface and the bottom surface, and

a handling feature comprising at least one of a pair of elongated side recesses for receiving a manipulator and a front recess, the handling feature facilitating handling and insertion of the spinal implant into an intervertebral space.

27. The spinal implant of claim 26 wherein the body forms a lordotic angle of about −20 degrees to about +20 degrees.

28. The spinal implant of claim 26 wherein the height of the anterior side is greater than the height of the posterior side.

29. The spinal implant of claim 26 wherein the body substantially forms a trapezoidal shape in longitudinal cross-section.

30. The spinal implant of claim 26 wherein the projections are substantially uniform, upwardly protruding ribs.

31. The spinal implant of claim 26 wherein the projections are randomly disposed.

32. The spinal implant of claim 26 wherein the projections are upwardly protruding spikes.

33. The spinal implant of claim 26 wherein the projections are substantially uniform, upwardly protruding, elongated ribs separated by concave channels.

34. The spinal implant of claim 33 wherein the angular pitch of the projections is between 1.75 degrees to 1.9 degrees.

35. The spinal implant of claim 33 wherein the projections have a minimum depth of 0.022 inches.

36. The spinal implant of claim 33 wherein the projections have an internal radius of about 0.022 inches.

37. The spinal implant of claim 26 wherein the front recess is elongated with a major axis that is substantially transverse.

38. The spinal implant of claim 26 wherein orientation of the transverse cross section is perpendicular to the z-axis.

39. The spinal implant of claim 26 wherein the body consists entirely of bioactive material.

40. The spinal implant of claim 26 wherein the body comprises DUDMA and TEGDMA resins.

41. The spinal implant of claim 26 wherein the body comprises PEEK, carbon reinforced PEEK, carbon reinforced barium sulfate PEEK, resorbable PLA, PGA, PLA/PGA, PLLA, or polyethylene.

42. The spinal implant of claim 26 where in the body comprises Titanium, stainless steel, or cobalt chromium.

43. The spinal implant of claim 26 wherein the handling feature consists of the side recesses.

44. The spinal implant of claim 26 wherein the handling feature consists of the front recess.

45. The spinal implant of claim 26 wherein the handling feature further comprises a front opening.

46. The spinal implant of claim 45 wherein the front opening is threaded.

47. The spinal implant of claim 26 wherein the handling feature includes both the side recesses and the front recess.

48. The spinal implant of claim 26 wherein the major recess forms a longitudinal through-aperture.

49. The spinal implant of claim 26 wherein the recess contains a bone graft material.

50. The spinal implant of claim 26 further comprising side apertures formed in the sides.

51. The spinal implant of claim 26 wherein the handling feature includes an aperture formed in communication with the front recess.

52. The spinal implant of claim 26 wherein the implant is in communication with other synthetic intervertebral bodies to aid in fusion of adjacent vertebrae.

53. A spinal implant comprising:

a body comprising a bioactive substance, further comprising:

an anterior side, a posterior side opposing the anterior side, and a pair of opposing sidewalls, said sidewalls being generally outwardly curved;

a top surface and a bottom surface, both surfaces coupled with the sides, each one of the top surface and the bottom surface forming plural projections for enhancing interaction with a synthetic or natural vertebral body;

at least one major recess formed in the body in communication with at least one of the top surface and the bottom surface;

a handling feature comprising recesses in the top and bottom surfaces in communication with the anterior and posterior sides and at least one recess in the anterior or sidewalls, the handling feature facilitating handling and insertion of the spinal implant into an intervertebral space.

54. The spinal implant of claim 53 wherein the anterior and posterior sides are parallel.

55. The spinal implant of claim 53 wherein the anterior and posterior sides are generally outwardly curved.

56. The spinal implant of claim 53 wherein the lordotic angle ranges from about −20 degrees to about +20 degrees.

57. The spinal implant of claim 53 wherein the height of the anterior side is greater than a height of the posterior side.

58. The spinal implant of claim 53 wherein the major recess forms a longitudinal through-aperture.

59. The spinal implant of claim 53 wherein two major recesses form two longitudinal through apertures.

60. The spinal implant of claim 53 wherein the body substantially forms an oval shape in longitudinal cross-section.

61. The spinal implant of claim 53 wherein the projections are substantially uniform, upwardly protruding ribs.

62. The spinal implant of claim 53 wherein the projections are substantially uniform, upwardly protruding, elongated ribs separated by concave channels.

63. The spinal implant of claim 62 wherein the angular pitch of the projections is between 1.75 degrees to 1.9 degrees.

64. The spinal implant of claim 62 wherein the projections have a minimum depth of 0.022 inches.

65. The spinal implant of claim 62 wherein the projections have an internal radius of about 0.022 inches.

66. The spinal implant of claim 53 wherein the projections are randomly disposed.

67. The spinal implant of claim 53 wherein the projections are upwardly protruding spikes.

68. The spinal implant of claim 53 wherein the front recess is elongated with a major axis that is substantially transverse.

69. The spinal implant of claim 53 wherein orientation of the transverse cross section is perpendicular to the z-axis.

70. The spinal implant of claim 53 wherein the body consists entirely of bioactive material.

71. The spinal implant of claim 53 wherein the body comprises DUDMA and TEGDMA resins.

72. The spinal implant of claim 53 wherein the body comprises PEEK, carbon reinforced PEEK, carbon reinforced barium sulfate PEEK, resorbable PLA, PGA, PLA/PGA, PLLA, or polyethylene.

73. The spinal implant of claim 53 where in the body comprises Titanium, stainless steel, or cobalt chromium.

74. The spinal implant of claim 53 wherein the handling feature consists of only the side recesses.

75. The spinal implant of claim 53 wherein the handling feature consists of only the front recess.

76. The spinal implant of claim 53 wherein the handling feature includes both the side recesses and the front recess.

77. The spinal implant of claim 53 wherein the handling feature further comprises a front opening.

78. The spinal implant of claim 77 wherein the front opening is threaded.

79. The spinal implant of claim 53 wherein the implant is in communication with other synthetic intervertebral bodies to aid in fusion of adjacent vertebrae.

80. A spinal implant comprising:

a body comprising a bioactive substance, further comprising:

an anterior side, a posterior side opposing the anterior side, and a pair of opposing sidewalls, said sidewalls being generally outwardly curved;

a top surface and a bottom surface, both surfaces coupled with the sides, each one of the top surface and the bottom surface forming plural projections for enhancing interaction with a synthetic or natural vertebral body;

at least one major recess formed in the body in communication with at least one of the top surface and the bottom surface;

a handling feature comprising recesses in the top and bottom surfaces in communication with the anterior and posterior sides and at least one recess in the anterior or sidewalls for receiving an impaction tool, the handling feature facilitating handling and insertion of the spinal implant into an intervertebral space; and

a fastening feature comprising at least one through-aperture in communication with the anterior side and either the top or bottom surface for insertion of fasteners that communicate with a synthetic or natural vertebral body.

81. The spinal implant of claim 80 wherein the anterior and posterior sides are parallel.

82. The spinal implant of claim 80 wherein the anterior and posterior sides are generally outwardly curved.

83. The spinal implant of claim 80 wherein the lordotic angle ranges from about −20 degrees to about +20 degrees.

84. The spinal implant of claim 80 wherein the height of the anterior side is greater than a height of the posterior side.

85. The spinal implant of claim 80 wherein the major recess forms a longitudinal through-aperture.

86. The spinal implant of claim 80 wherein two major recesses form two longitudinal through apertures.

87. The spinal implant of claim 80 wherein the body substantially forms an oval shape in longitudinal cross-section.

88. The spinal implant of claim 80 wherein the projections are substantially uniform, upwardly protruding ribs.

89. The spinal implant of claim 80 wherein the projections are substantially uniform, upwardly protruding, elongate ribs separated by concave channels.

90. The spinal implant of claim 89 wherein the angular pitch of the projections is between 1.75 degrees to 1.9 degrees.

91. The spinal implant of claim 89 wherein the projections have a minimum depth of 0.022 inches.

92. The spinal implant of claim 89 wherein the projections have an internal radius of about 0.022 inches.

93. The spinal implant of claim 80 wherein the projections are randomly disposed.

94. The spinal implant of claim 80 wherein the projections are upwardly protruding spikes.

95. The spinal implant of claim 80 wherein the front recess is elongated with a major axis that is substantially transverse.

96. The spinal implant of claim 80 wherein orientation of the transverse cross section is perpendicular to the z-axis.

97. The spinal implant of claim 80 wherein the body consists entirely of bioactive material.

98. The spinal implant of claim 80 wherein the body comprises DUDMA and TEGDMA resins.

99. The spinal implant of claim 80 wherein the body comprises PEEK, carbon reinforced PEEK, carbon reinforced barium sulfate PEEK, resorbable PLA, PGA, PLA/PGA, PLLA, or polyethylene.

100. The spinal implant of claim 80 where in the body comprises titanium, stainless steel, or cobalt chromium.

101. The spinal implant of claim 80 wherein the handling feature consists of only the side recesses.

102. The spinal implant of claim 80 wherein the handling feature consists of only the front recess.

103. The spinal implant of claim 80 wherein the handling feature includes both the side recesses and the front recess.

104. The spinal implant of claim 80 wherein the handling feature further comprises a front opening.

105. The spinal implant of claim 104 wherein the front opening is threaded.

106. The spinal implant of claim 80 wherein the fastening feature has two through-apertures.

107. The spinal implant of claim 80 wherein the through-apertures of the fastening features are threaded.

108. The spinal implant of claim 80 wherein the fasteners are screws, pins, or nails.

109. The spinal implant of claim 80 wherein the implant is in communication with other synthetic intervertebral bodies to aid in fusion of adjacent vertebrae.

110. A spinal implant comprising:

a body comprising a bioactive substance, further comprising:

an anterior side and a posterior side being parallel to and opposing the anterior side;

a mesial side and a lateral side with one side being outwardly curved and the other being inwardly curved;

a top surface and a bottom surface, each of the top and bottom surfaces including plural projections for enhancing interaction with a synthetic or natural vertebral body;

a major recess formed in the body creating a longitudinal through-aperture in communication with the top and bottom surfaces, at least one minor recess formed in the body creating a latitudinal through-aperture in communication with the mesial and lateral sides, both through apertures in communication with each other; and

a handling feature comprising a pair of anterior recesses formed at points where the anterior side communicates with the mesial and laterial sides, said recesses used for receiving a manipulator, a pair of posterior recess formed at points where the posterior side communicates with the mesial and lateral sides, and a front recess formed in the anterior side and a rear recess formed in the posterior side both communicating with a through-aperture, the handling feature facilitating handling and insertion of the spinal implant into an intervertebral space.

111. The spinal implant of claim 110 wherein at least one of the top or bottom surfaces is outwardly curved.

112. The spinal implant of claim 110 wherein only one of the top or bottom surfaces is outwardly curved.

113. The spinal implant of claim 110 wherein the lordotic angle ranges from about −20 degrees to about +20 degrees.

114. The spinal implant of claim 110 wherein the height of the anterior side is greater than a height of the posterior side.

115. The spinal implant of claim 110 wherein the projections are substantially uniform, upwardly protruding ribs.

116. The spinal implant of claim 110 wherein the projections are substantially uniform, upwardly protruding, elongated ribs separated by concave channels.

117. The spinal implant of claim 116 wherein the angular pitch of the projections is between 1.75 degrees to 1.9 degrees.

118. The spinal implant of claim 116 wherein the projections have a minimum depth of 0.022 inches.

119. The spinal implant of claim 116 wherein the projections have an internal radius of about 0.022 inches.

120. The spinal implant of claim 110 wherein the projections are randomly disposed.

121. The spinal implant of claim 110 wherein the projections are upwardly protruding spikes.

122. The spinal implant of claim 110 wherein the front recess is elongated with a major axis that is substantially transverse.

123. The spinal implant of claim 110 wherein the body consists entirely of bioactive material.

124. The spinal implant of claim 110 wherein the body comprises DUDMA and TEGDMA resins.

125. The spinal implant of claim 110 wherein the body comprises PEEK, carbon reinforced PEEK, carbon reinforced barium sulfate PEEK, resorbable PLA, PGA, PLA/PGA, PLLA, or polyethylene.

126. The spinal implant of claim 110 where in the body comprises titanium, stainless steel, or cobalt chromium.

127. The spinal implant of claim 110 wherein the implant is in communication with other synthetic intervertebral bodies to aid in fusion of adjacent vertebrae.

128. A spinal implant comprising:

a body comprising a bioactive substance, further comprising:

an anterior side and a posterior side being parallel to and opposing the anterior side;

a mesial side and a lateral side with at least one side being outwardly curved;

a top surface and a bottom surface, each of the top and bottom surfaces including plural projections for enhancing interaction with a synthetic or natural vertebral body;

a major recess formed in the body creating a longitudinal through-aperture in communication with the top and bottom surfaces;

a handling feature comprising a pair of anterior recesses formed at points where the anterior side communicates with the mesial and lateral sides, said recesses used for receiving a manipulator, a pair of posterior recesses formed at points where the posterior side communicates with the mesial and lateral sides, and a front recess formed in the anterior side and a rear recess formed in the posterior side both communicating with a through-aperture, the handling feature facilitating handling and insertion of the spinal implant into an intervertebral space.

129. The spinal implant of claim 128 wherein one of the mesial or lateral sides is inwardly curved.

130. The spinal implant of claim 128 further comprising at least one minor recess formed in the body of the implant

creating a latitudinal through-aperture in communication with the mesial and lateral sides.

131. The spinal implant of claim 130 having two minor recesses.

132. The spinal implant of claim 128 wherein at least on of the top or bottom surfaces are outwardly curved.

133. The spinal implant of claim 128 wherein only one of the top or bottom surfaces are outwardly curved.

134. The spinal implant of claim 128 wherein the lordotic angle ranges from about −20 degrees to about +20 degrees.

135. The spinal implant of claim 128 wherein the height of the anterior side is greater than a height of the posterior side.

136. The spinal implant of claim 128 wherein the projections are substantially uniform, upwardly protruding ribs.

137. The spinal implant of claim 128 wherein the projections are substantially uniform, upwardly protruding, elongate ribs separated by concave channels.

138. The spinal implant of claim 137 wherein the angular pitch of the projections is between 1.75 degrees to 1.9 degrees.

139. The spinal implant of claim 137 wherein the projections have a minimum depth of 0.022 inches.

140. The spinal implant of claim 137 wherein the projections have an internal radius of about 0.022 inches.

141. The spinal implant of claim 128 wherein the projections are randomly disposed.

142. The spinal implant of claim 128 wherein the projections are upwardly protruding spikes.

143. The spinal implant of claim 128 wherein the front recess is elongated with a major axis that is substantially transverse.

144. The spinal implant of claim 128 wherein the body consists entirely of bioactive material.

145. The spinal implant of claim 128 wherein the body comprises DUDMA and TEGDMA resins.

146. The spinal implant of claim 128 wherein the body comprises PEEK, carbon reinforced PEEK, carbon reinforced barium sulfate PEEK, resorbable PLA, PGA, PLA/PGA, PLLA, or polycthylenc.

147. The spinal implant of claim 128 where in the body comprises titanium, stainless steel, or cobalt chromium.

148. The spinal implant of claim 128 wherein the implant is in communication with other synthetic intervertebral bodies to aid in fusion of adjacent vertebrae.

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